

Vos, Rob

**Working Paper**

## Agricultural and rural transformations in Asian development: Past trends and future challenges

WIDER Working Paper, No. 2018/87

**Provided in Cooperation with:**

United Nations University (UNU), World Institute for Development Economics Research (WIDER)

*Suggested Citation:* Vos, Rob (2018) : Agricultural and rural transformations in Asian development: Past trends and future challenges, WIDER Working Paper, No. 2018/87, ISBN 978-92-9256-529-9, The United Nations University World Institute for Development Economics Research (UNU-WIDER), Helsinki,  
<https://doi.org/10.35188/UNU-WIDER/2018/529-9>

This Version is available at:

<https://hdl.handle.net/10419/190136>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



UNITED NATIONS  
UNIVERSITY  
**UNU-WIDER**

WIDER Working Paper 2018/87

## **Agricultural and rural transformations in Asian development**

Past trends and future challenges

Rob Vos\*

August 2018

**Abstract:** Over the past sixty years, most Asian countries have undergone relatively rapid agricultural transformations that helped jumpstart broader economic development. However, the changes have differed markedly in nature and speed across countries of the region. In much of East and Southeast Asia, the Green Revolution brought a quantum leap in yields of staple crops. Agricultural productivity growth facilitated labour exit and savings transfers, which helped jumpstart industrial growth and urbanization, which in turn induced deeper agrarian change and food system transformations. In South Asia, these transformative changes have lagged in part because of structural hurdles to agrarian change signalled by Gunnar Myrdal in his seminal book *Asian Drama* of 1968. More recently, South Asian economies also managed to overcome most of those obstacles, inducing accelerated growth of both agriculture and non-agricultural sectors. Vast challenges of still widespread poverty and food insecurity in this part of Asia remain. These challenges remain in a context of relatively advanced urbanization, strongly changed dietary patterns and agri-food systems, and pressing environmental constraints. Consequently, as this paper argues, moving forward, the role and nature of agricultural transformations and structural change in forging economic growth and poverty reduction in still disadvantaged regions of Asia will need to be different as well.

**Keywords:** Agricultural productivity, structural change, rural transformations, poverty, rural–urban linkages, food policy

**JEL classification:** O13, O18, O47, Q18

**Acknowledgements:** I am grateful to Deepak Nayyar, Frances Stewart, Sudipto Mundle, two anonymous referees, as well as to the participants of the project workshop held in Hanoi in March 2018 for helpful comments on earlier drafts of this paper. Any possible errors are mine.

---

\*International Food Policy Research Institute, Washington, DC, USA, email: [vos\\_rob@yahoo.com](mailto:vos_rob@yahoo.com).

This study has been prepared within the UNU-WIDER project on ‘Asian Transformations: An Inquiry into the Development of Nations’.

Copyright © UNU-WIDER 2018

Information and requests: [publications@wider.unu.edu](mailto:publications@wider.unu.edu)

ISSN 1798-7237 ISBN 978-92-9256-529-9

Typescript prepared by Lesley Ellen.

The United Nations University World Institute for Development Economics Research provides economic analysis and policy advice with the aim of promoting sustainable and equitable development. The Institute began operations in 1985 in Helsinki, Finland, as the first research and training centre of the United Nations University. Today it is a unique blend of think tank, research institute, and UN agency—providing a range of services from policy advice to governments as well as freely available original research.

The Institute is funded through income from an endowment fund with additional contributions to its work programme from Finland, Sweden, and the United Kingdom as well as earmarked contributions for specific projects from a variety of donors.

Katajanokanlaituri 6 B, 00160 Helsinki, Finland

The views expressed in this paper are those of the author(s), and do not necessarily reflect the views of the Institute or the United Nations University, nor the programme/project donors.

## 1 Introduction

Over the past sixty years, most Asian countries have undergone relatively rapid agricultural transformations that helped jumpstart broader economic development. However, the changes have differed markedly in nature and speed across countries of the region. In much of East and Southeast Asia, the Green Revolution brought a quantum leap in yields and output of rice and wheat, which boosted smallholder farm productivity and profits. Farms became more commercial and agricultural value added per worker rose significantly. Public investment and strong support for smallholder agriculture and agrarian reforms through to the late 1990s paved the way for manufacturing industries to develop. Gradually, aggregate economic growth increasingly depended on dynamics in the service and industrial sectors. While the Green Revolution also played an important role in South Asia, the processes of agricultural transformation and structural change have lagged the ones taking place in East Asia. The service sector has become predominant, especially in India, and a mature manufacturing sector has yet to develop. Institutional reforms and public support for rural infrastructure were less pervasive. As a result, South Asia has been slow in making the shift from low- to high-productivity employment, despite the decline in agriculture's share in total gross domestic product (GDP).

These are symptoms of deeper-rooted factors which delayed transformative change, including those that concerned Gunnar Myrdal when he wrote his three-volume *Asian Drama* (Myrdal 1968). At the time of writing, he saw a kind of drama playing out in post-colonial South Asia, and despite the complexities and dissimilarities among the different nations of South Asia there was a clear-cut set of conflicts and a common theme, as in any drama, trapping people into poverty. Myrdal's other seminal contribution (building on ideas of Wicksell and Kaldor) is the concept of circular cumulative causation (Myrdal 1957). From this perspective, he saw that constraints to natural resource availability, historical traditions of production activity, weak institutions, lack of national cohesion, and/or traditional or religious beliefs could conspire to holding back agriculture and broader economic development in cumulative causation.

Myrdal's analysis—and his pessimism—focused mainly on India, but he extended this to Indonesia and other countries as well. He believed that traditional power structures were likely to persist. Unless there was change, the chances of economic take-off were slim. He perceived governments in the region as too 'soft', unable to enforce the discipline that was needed to implement their development plans. He doubted whether faster agricultural development, crucial for raising living standards in the rural areas and to provide the savings and markets to support industrialization, would take place without either radical land distribution or consolidation into communes, neither of which he believed was politically feasible (Lankester 2004).<sup>1</sup> In such settings, the effect of pushing out labour from traditional activity would initially lead to the reduction of employment, income, and demand. The consequent contraction of the markets would have a depressing effect

---

<sup>1</sup> Indeed, in early 1969, around the time of the publication of *Asian Drama*, India witnessed spates of violence with incidents unfolding in areas where the seeds for the Green Revolution in agriculture had been sowed. The concentration of new seeds, fertilizers, and pesticides and the resulting gains in agricultural productivity in the hands of wealthier farmers drew the anger of those left behind. Siegel (2017) cites alarming newspaper reports of the time saying that '[t]he eyes of the small farmers, sharecroppers, and landless labourers are turning red with rage rather than green with jealousy when they see the big farmers in their village reaping the entire benefit of the green revolution'. It created fears for a red revolution to emerge. While India did not see as much as a red revolution, its progress in terms of economic transformation and poverty reduction took a different, and certainly, slower turn than many of fast developers in the region.

on new investments, which in turn causes a further reduction of income and demand and, if nothing happens to modify the trend, there is a net movement of enterprises and workers towards other areas.

In today's context, the question is how Asian societies managed to break away from this cycle and what type of more benign rural transformation process would be needed to meet today's challenges of accelerated urban population growth, rising inequality, unprecedented size of young populations limited employment prospects, and environmental constraints and threats.

This paper re-examines Asia's agricultural and rural transformations in the context of economy-wide structural change. It will focus on the different pathways Asian societies have taken in terms of agricultural transitions; transformation of food systems with rising incomes and urbanization; infrastructure development to forge rural–urban linkages; and implications of broader structural economic transformations, with the objective of identifying the factors of cumulative causation explaining why development accelerated in one part of the region and lagged in another. In light of the review of evidence presented in this paper, lessons will be drawn as to how to address today's challenges for the development of Asia's agriculture and food systems and possible pathways for more inclusive and sustainable rural transformations in the coming decades.

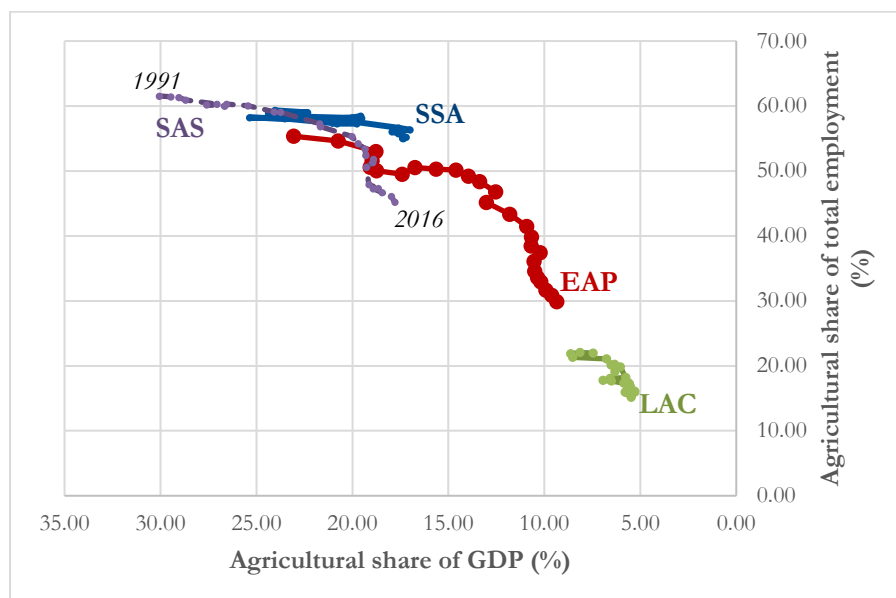
## **2 Exiting agriculture, patterns of structural change, and poverty reduction**

### **2.1 Agricultural exit and structural change**

Economic development has historically been characterized by sustained structural change, typically initiated by a shift of labour out of agriculture into the 'modern' industrial sector. The result of this process is an increased share of non-agricultural sectors in GDP, as well as in employment. The Lewis dual-economy model provided an early theoretical formulation of this process (Lewis 1954). Investment in modern sector capital would drive economic growth inducing excess labour in agriculture (whose marginal product was assumed to be zero) to move to the modern sector. For most of Asia and Latin America, this modern sector has been industry; rapid growth in Asia has also been spurred by exports of industrial products (especially in China and other parts of East Asia). In India, in contrast, recent structural transformation has been characterized by greater employment in services (both formal and informal), rather than industry (Ashan and Mitra 2016).

As shown in Figure 1, since the early 1990s, structural change has moved faster in developing countries in East Asia and the Pacific (EAP) and South Asia (SA) than in Latin America (LAC), where structural change advanced in earlier decades, and sub-Saharan Africa, where change has lagged. In EAP, the share of agriculture in GDP fell by 13.8 percentage points (from 23.1 in 1991 to 9.3 per cent in 2016), while the share of agricultural employment fell by 25.4 percentage points (from 55.3 to 29.9 per cent). Starting from higher levels, the degree of change in South Asia was similar with the shares of agriculture in GDP and employment falling by 12.3 and 16.4 percentage points, respectively. Despite this labour exit from agriculture, the sector still provides employment to almost half (45 per cent) of the labour force. Structural transformation in Latin America had already taken place in previous decades in much of the region, showing relatively small recent changes. Sub-Saharan African countries, in contrast, continue to have economies with relatively large shares of agricultural employment and value added, as the speed of structural transformation remains slow: the share of agricultural employment declined by only 7 percentage points between 1991 and 2016, while the share of agriculture in GDP fell by only 3.7 percentage points. As a result, agriculture still employs well over half (55 per cent) of Africa's labour force.

Figure 1: Agriculture and structural change by developing region, 1991–2016



Note: EAP = Developing countries in East and Southeast Asia and Pacific; LAC = Latin American and Caribbean; SAS = South Asia; SSA = sub-Saharan Africa.

Source: Author's calculations based on World Bank (n.d.) World Development Indicators for GDP data, and ILO (n.d.) ILOSTAT database for employment data.

Falling shares of agricultural GDP with rising per capita income levels are a macroeconomic expression of Engel's law, reflective of a declining share of food expenditures in total consumption as incomes rise. This also has been a consistent pattern of growth pathways in Asia, with some variations in speed and degree.

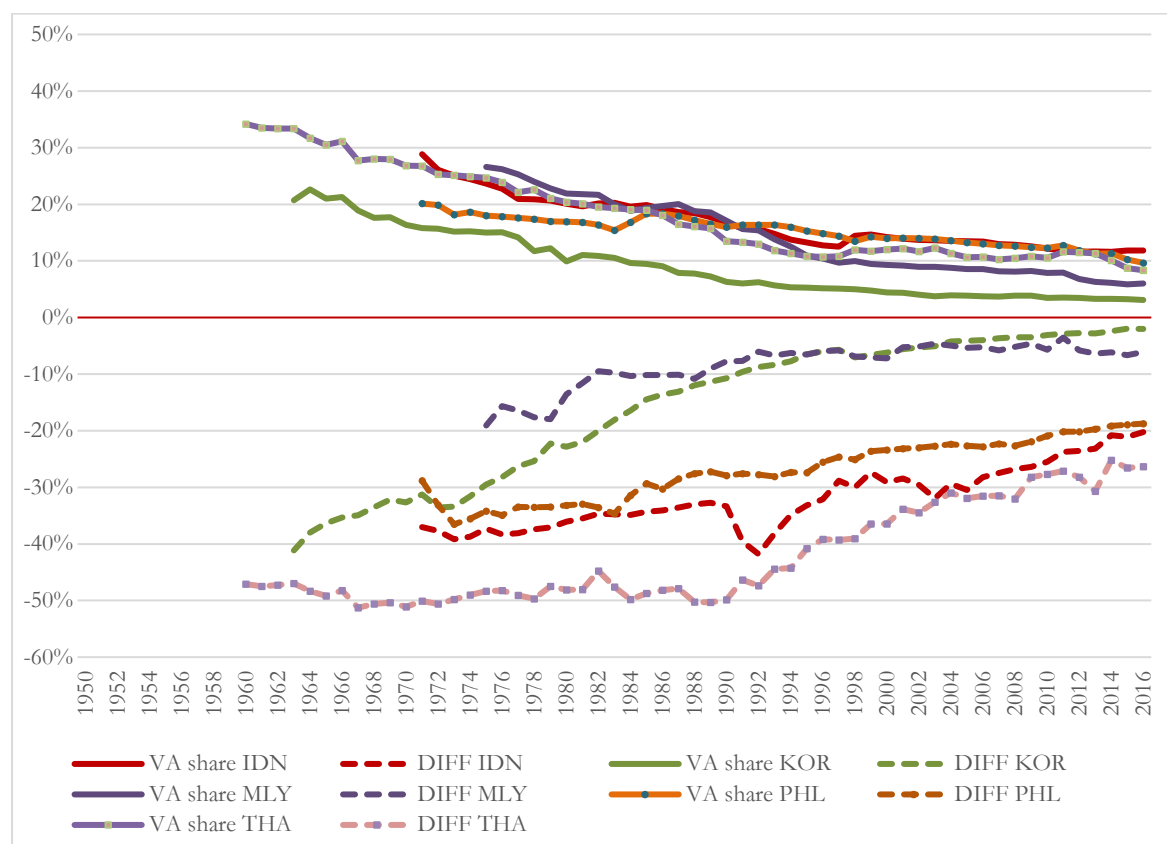
Figures 2a–b and 3a–b show this for the major Asian economies in a way suggested by Timmer (2008).<sup>2</sup> The figures plot trends in the agricultural share in GDP against the difference between the shares of agricultural value added in total GDP and agricultural employment in total employment (*DIFF*), and against income per capita for the period between 1960 and 2016. Falling and converging agricultural value added and employment shares would reflect agricultural productivity growth that 'pushes' structural change. Japan's structural change is most advanced with agriculture shares of GDP of below 2 per cent and agriculture's employment share below 5 per cent (Figure 2b). Structural change in the Republic of Korea started much later, but accelerated from the 1970s to similarly low agricultural shares as prevailing nowadays in Japan. Malaysia's degree of structural change is not far behind. Indonesia, the Philippines, and Thailand still have relatively high shares of agricultural employment at around 30 per cent or more, with the pace of structural change (as reflected in the decline of the *DIFF* variable) picking up from the 1990s. In these countries, the labour exit from agriculture has lagged the speed in the decline of agriculture's share in GDP. The relative size of Viet Nam's agricultural sector was stagnant at around 40 per cent of GDP during the 1970s and 1980s, to start its descent only after the *doi moi* agrarian reform policies of 1987 and 1988 induced a shift away from collective farms to individual private farming (see e.g. McCaig and Pavcnik 2016). However, the agricultural employment share remained high at 65–70 per cent of the labour force until the early 2000s. Additional domestic and external

<sup>2</sup> At difference from Timmer's presentation, though, the relationship between structural change and GDP per capita is shown in two steps to preserve a vision of the sequencing of the change over time, as all lines in Figures 2a–b and 3a–b represent time series.

reforms lifting price controls and restrictions in the mid-1990s induced greater adoption of modern farming practices, pushing up agricultural productivity growth and accelerating the exit of labour from agriculture. Agriculture's employment share dropped from 65 per cent in 2000 to just over 40 per cent in 2016.

In comparison to the other major Asian economies, India's process of structural change appears to be a bit of an outlier. The Green Revolution pushed up agricultural productivity in the country's expanding commercial farm sector. Agriculture's share in GDP declined with the expansion of non-agricultural sectors (Figure 2b) and, despite relatively limited labour exit from agriculture, as many (hundreds of millions) smallholders and landless agricultural workers were left behind in the agricultural transformation process. Between 1960 and 1985, agriculture's share in GDP declined from over 60 per cent to about 40 per cent; the sector's employment share remained near stable at around 70 per cent. Agriculture's employment share has declined since, but slowly, to around 2000 (when it still stood at 60 per cent). The labour exit from agriculture has accelerated since as the overall pace of growth of the Indian economy picked up significantly. In 2016, still about 45 per cent of the labour force worked in agriculture, at par (also in terms of the degree of structural change) with that of Viet Nam. The slow drop in agriculture's employment share signals a decline in agriculture's relative productivity rate. At difference with Viet Nam and the rest of the Asian economies, Indian workers leaving agriculture have largely sidestepped manufacturing, whose shares in GDP and employment remain low at around 12 per cent. Instead, the structural change has been towards modern and informal services sectors, with the modern part being a major driver of the recent growth acceleration (Ashan and Mitra 2016).

Figure 2a: Declining weight of agriculture in GDP and employment in Indonesia, Korea (Rep. of), Malaysia, Thailand, and the Philippines, 1960–2016

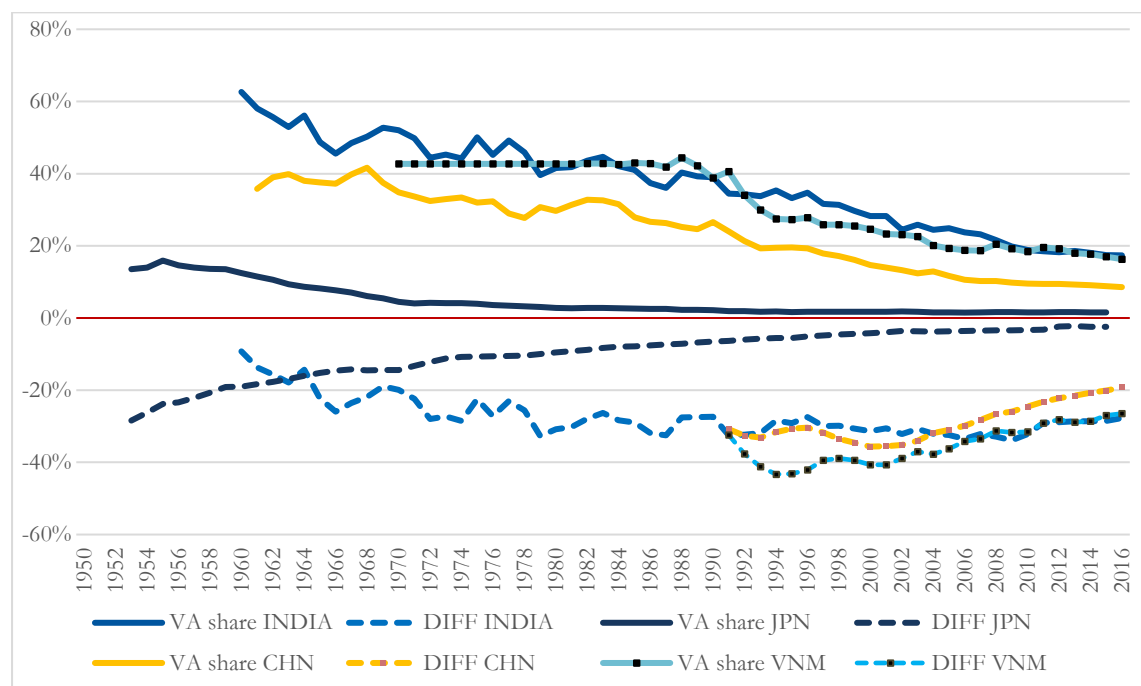


Note: *VAshare* = agricultural value added as % of total GDP; *DIFF* = difference between agricultural value added as % of GDP and agricultural employment share in total employment. CHN = China (1961–2016 for VA share and 1991–2016 for DIFF); IDN = Indonesia (1971–2016); INDIA = India (1960–2016); JPN = Japan (1953–2015);

KOR = Republic of Korea (1963–2016); MLY = Malaysia (1975–2016); PHL = Philippines (1971–2016); THA = Thailand (1960–2016); VNM = Viet Nam (1970–2016 for VA share and 1991–2016 for DIFF).

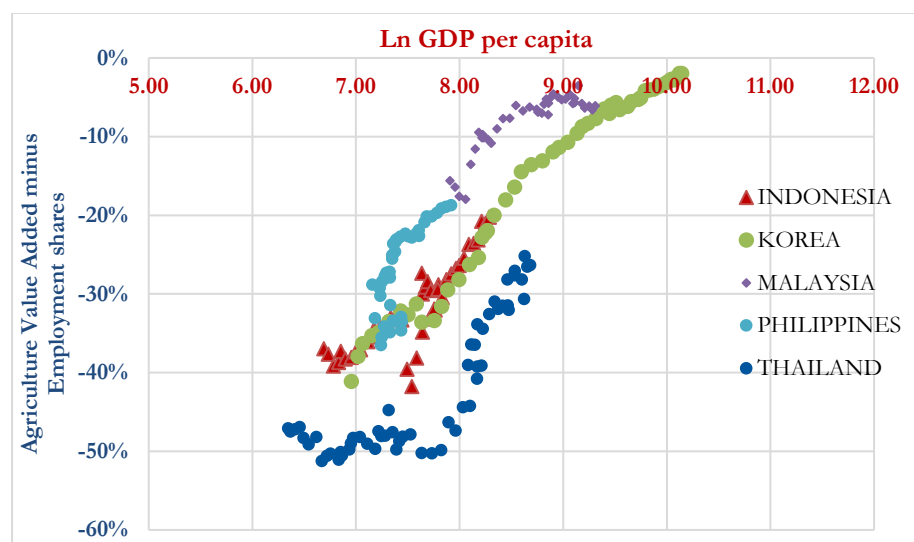
Source: Author's calculations based on sectoral national income and employment data from Groningen Growth and Development Centre (n.d.) database, World Bank (n.d.) World Development Indicators, and ILO (n.d.) ILOSTAT.

Figure 2b: Declining weight of agriculture in GDP and employment in China, India, Japan, and Viet Nam, 1950–2016



Source and notes: See Figure 2a.

Figure 3a: Convergence of declining agricultural value added and employment shares with rising income per capita in Indonesia, Rep. of Korea, Malaysia, Philippines, and Thailand, 1950–2016

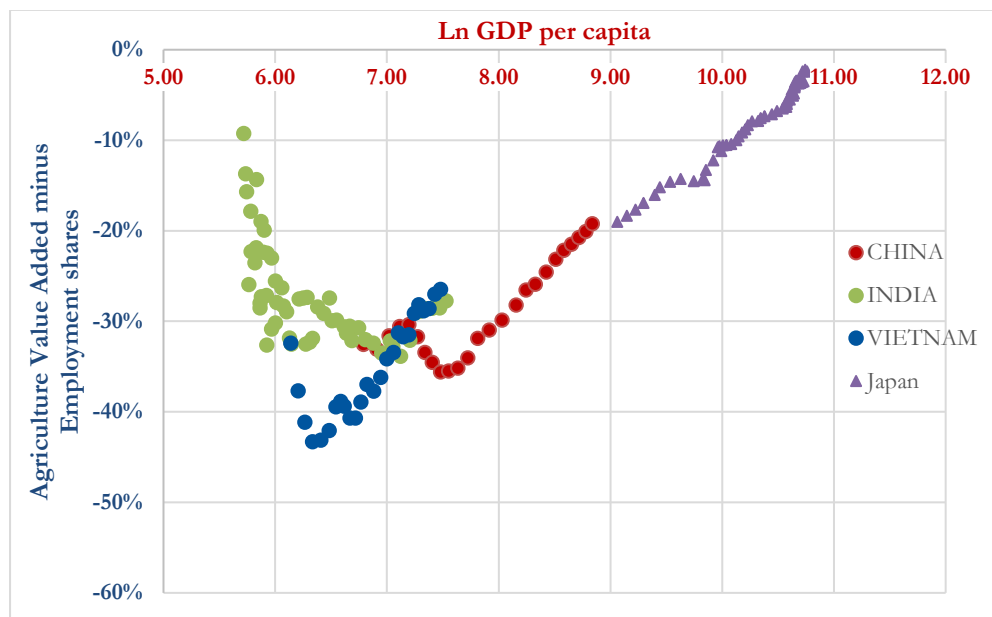


Note: See notes to Figure 2a for time periods covered for each country.

Source: Author's calculations from sectoral national income and employment data from Groningen Growth and Development Centre (n.d.) database, World Bank (n.d.) World Development Indicators, and ILO (n.d.) ILOSTAT.



Figure 3b: Convergence of declining agricultural value added and employment shares with rising income per capita in China, India, and Viet Nam, 1950–2016



Source and notes: As in Figure 3a.

## 2.2 Structural change, growth, and poverty reduction

Economic growth in the developing world has led to substantial reductions in poverty over the last two and half decades. Much of this success was driven by structural change and associated fast economic growth in Asia. Within the region at large, poverty reduction has been more pronounced in East and Southeast Asia, most of which have progressed further in terms of structural change. The average poverty headcount for these two regions fell from 60.2 per cent in 1990 to 3.5 per cent in 2013 (World Bank 2017).<sup>3</sup> Around 2015, less than 10 per cent of the world's poor population lived in East and Southeast Asia, down from more than half in 1990. The poverty rate also declined significantly in South Asia over this period (from 44.6 to 15.1 per cent), but not as dramatically as in East Asia and, because of faster population growth in South Asia, the sub-region's share of the world's poor population increased from 27.4 to 33.5 per cent. Poverty reduction in sub-Saharan Africa has lagged well behind, as the region's per capita income grew at only 1.3 per cent per year during 1990 to 2015 (three times below the developing country average). Poverty in sub-Saharan Africa fell from 48.2 per cent in 1990 to 41.0 per cent in 2013.

At going trends, the global poverty challenge will concentrate on the African continent and, to a lesser extent, in South Asia (see e.g. Thurlow et al. 2018). These are also the regions where rural populations are still growing and the Lewis turning point is yet to be reached.<sup>4</sup> It further suggests that faster agricultural productivity growth in the low-income countries is needed to foster both structural change and poverty reduction. Various studies provide evidence showing that, especially

<sup>3</sup> The poverty headcount is calculated using the World Bank's poverty line of \$1.90 in purchasing power parity (PPP) per person per day.

<sup>4</sup> The Lewis turning point is that where the reallocation of labour from agriculture to non-agricultural sectors through internal migration is complete (Lewis, 1954). At that point, Lewis assumed, the flow of rural-urban migration will be reduced and industrial wages will be pushed upwards. Thus, the wage share in total value added will increase and (factor income) inequality would decline.

in countries in early stages of structural transformation, agricultural productivity growth has a larger poverty-reduction effect than increases in industry or services (Ivanic and Martin 2018; World Bank 2008).<sup>5</sup> While impacts vary across countries, also within South Asia, agricultural growth seems more important to poverty reduction than growth in other sectors. The study by Ivanic and Martin (2018) finds that the impact of productivity improvements in agriculture (equivalent to 1 per cent of GDP) would reduce poverty in India by 1.6 percentage points, more than three times the impact of productivity improvements of the same relative magnitude in industry and services. In Bangladesh, the impact of agricultural productivity growth on poverty reduction would be even greater (2.6 percentage points) and more than six times that of non-agricultural sectors, while—in contrast—in Viet Nam, the poverty-reduction impact from agricultural growth would be much smaller and only marginally higher than that of productivity growth in industry or services. This suggests different pathways towards inclusive structural change are possible. To understand those, it is important to look to at the key factors that influence sectoral poverty–growth elasticities.

### **3 Agriculture and food system changes as conditioners of inclusive and exclusive structural transformation**

According to Timmer (2014), three key lessons can be drawn from historical pathways of structural transformation. First, structural transformation has shown to be an important way for people to climb out of poverty, especially when productivity rises in both agricultural and non-agricultural sectors through strong inter-sectoral linkages (Hirschman 1958; World Bank 2008). Without broad-based productivity growth, labour more likely will be ‘pushed’ into low-paying informal service jobs, rather than ‘pulled’ out by highly productive manufacturing and services. Second, even with broad-based productivity growth, structural transformation tends to widen the income gap between agricultural and non-agricultural sectors and between rural and urban areas, putting most of the pressure on rural societies to adjust. Third, in order to catalyse productivity growth and structural change, substantial investments in the agricultural sector are needed despite its declining relative importance.

However, the way in which these factors played out in the past, and should be expected to play out moving forward, is conditioned on five other transformative processes that are taking place in parallel: urbanization, dietary change, agricultural technology and farm size change, food market transformations, and rural labour market changes (Reardon and Timmer 2014). All of these change processes are relevant to structural change in Asia. They should be seen as linked in cumulative causation, as Myrdal would argue. These factors will be discussed in the subsequent sub-sections, starting with the importance of shifting demographics and changing diets, followed by the role of changing farm technologies and farming systems, the dynamics of rural non-farm activities in driving the nature of agricultural transformations. The role of policies and institutional reforms in all of this will be taken on in Section 4.

---

<sup>5</sup> Ivanic and Martin (2018), for instance, simulate sectoral productivity improvements equivalent to 1 per cent of GDP of developing countries. An agricultural productivity shock would decrease global poverty by 0.85 percentage points, more than double the impact from productivity improvements of similar magnitude in industry and services. They also signal, however, that such impacts may vary from country to country, as noted in the text.

### 3.1 Shifting demographics, shifting diets

Myrdal wrote *Asian Drama* against the prevailing economic and social conditions in the 1950s and 1960s. Painted with a broad brush, most Asian economies were still strongly agrarian based, most people living in rural areas, and population growth driven by high fertility rates. Land was scarce, though generally fertile, such that intensification of staple crop production would be critical to addressing both the challenges of food insecurity and poverty. With economic development, however, demographic pressures have changed, as population growth has decelerated and urbanization rates have gone up. Fertility rates and family sizes have fallen with income levels, altering the underlying drivers of economic growth, as capital accumulation becomes more important than labour supply. Higher average urban incomes and larger city populations have led to expanding urban food markets and have changed the composition of food demand, as higher incomes lead to dietary change: even as food shares tend to fall (Engel's law), total food expenditures typically continue to rise with per capita incomes, as the share of dietary energy that comes from typically cheaper cereals and other starchy food staples falls while consumption of more expensive animal-sourced foods, fruits and vegetables, and processed foods increases (Benett's law). These changes associated with urbanization have created new opportunities for farmers in terms of larger food markets for products with, generally, higher value added, meeting the needs of a rising Asian middle class (Tschirley et al. 2015). Meats, dairy products, and fruits and vegetable production require higher input use (land, water, fertilizers, and/or pesticides), inducing changes in land use and requiring farmers to adopt new technologies.

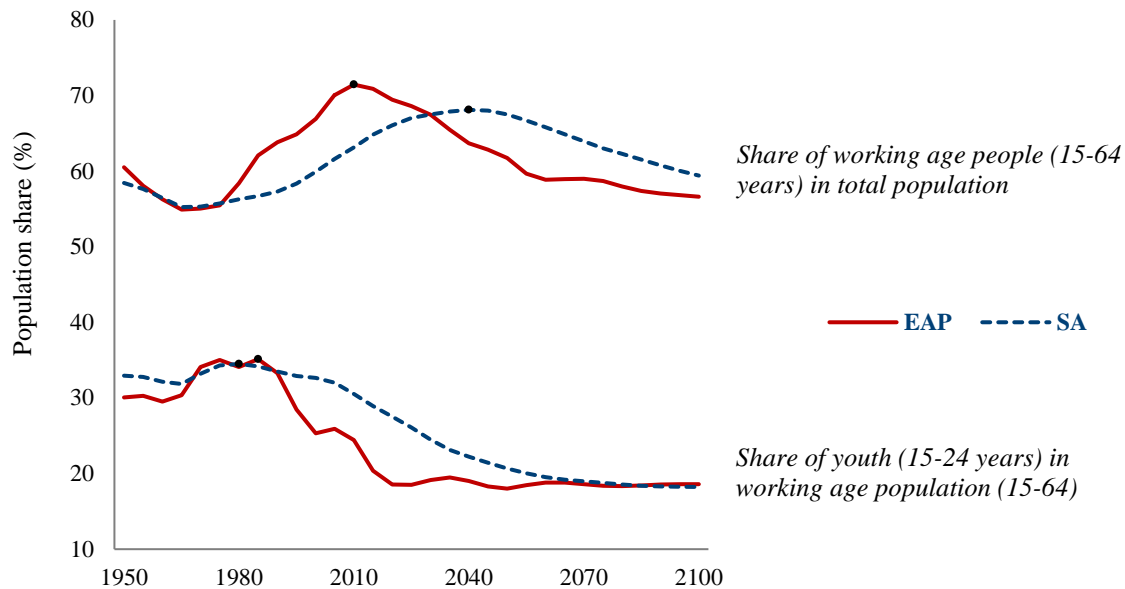
The changing demographics and diets not only have changed agricultural transformations processes, but also created new challenges. Increased resource use may lead to overexploitation of natural resources and accelerate environmental degradation, where land and water resources are already scarce (Vos and Bellù 2018). Where population growth is still strong, expanding rural populations may increase population density and reduce average farm size, especially among smallholders (Masters et al. 2013). This could induce farmers to diversify into off-farm employment, which could help accelerate positive structural change and poverty reduction, if rural non-farm activity expands alongside and rural–urban linkages are strengthened.

On the Asian continent, urbanization has advanced farthest in East Asia, where 60 per cent of the population lives in cities today and the share is expected to rise to 80 per cent by 2050 (Appendix Figure A.1). Importantly, East Asia's rural population started to decrease in absolute terms from around 2005, reflective of advanced structural economic change. The Republic of Korea's rural population started to decrease from 1970 and its urban population share had already surpassed 80 per cent by 2015 and is projected to reach almost 90 per cent by 2050. China's urban share in the population increased from less than 20 per cent at the start of its economic take-off around 1980 to 56 per cent in 2015 and is projected to increase to 75 per cent by 2050 (Figure A.2a). The absolute size of China's rural population has been decreasing since 1995. Korea's and China's populations are ageing rapidly and their total populations are expected to shrink from around 2030 onwards.

South Asia is the least urbanized region (even less so than sub-Saharan Africa), its rural population is expected to continue to grow *in absolute terms* until about 2030. This is also the case in India (Figure A.2c). In Southeast Asia, Thailand and Malaysia had reached their Lewisian turning points around 2000 (Figure A.2b). Indonesia and Viet Nam did so more recently, while the Philippines—where population growth is still high—is not expected to reach its turning point before 2040. Due to restrictive population control policies, East Asia (China in particular) reached its demographic transition point much earlier than countries in South Asia. This is also evident from today's youth dynamics. South Asia's youth population is expanding at a rate close to the total population's growth rate, whereas East Asia's youth population is falling in absolute terms and almost as fast as

the rural population (Figure 4). These trends set different employment challenges across the Asian continent, with those in South Asia being most pressing from a structural transformation perspective, as rural populations are still large and rising and vast numbers of young people are entering rural labour markets every year.

Figure 4: Demographic transition in Asia, 1950–2100



Note: Data for 1955–2015 are estimated trends and projections (medium variant) for 2020–2100. EAP = East Asia and Pacific (includes South-East Asia) and SA = South Asia.

Source: Author's calculations based on UN Population Division, World Population Prospects: The 2017 Revision, online database (United Nations 2017).

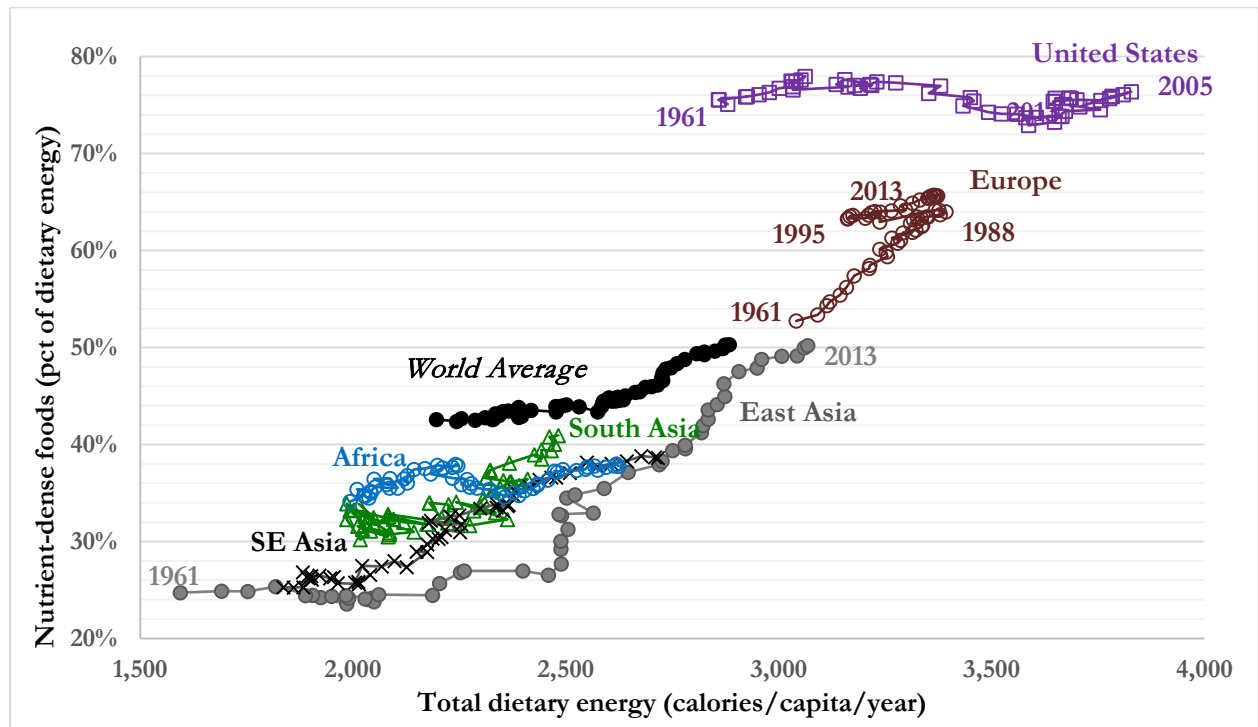
Dietary transitions are also taking place at different speeds across the continent. Figure 5 shows long-term trends in the per capita quantity of all foods, measured in calories, and fraction of those calories that come from foods other than starchy staples using data from the food balance sheets of the Food and Agriculture Organization (FAO).<sup>6</sup> Clearly, Asia's sub-regions start at the bottom left of the chart, but, as their incomes have risen, total food energy supply (and apparent consumption) have increased starkly since the 1960s, while the share of non-starchy staple crops has increased. This is most visible in East Asia with over 50 per cent of food energy intake coming from foods other than cereals and starchy roots. In South and Southeast Asia, the dietary transition is clearly less advanced but has accelerated over the past two decades.

Increased per capita incomes bring not only increased diversity in the types of food, but also the forms in which those foods are consumed (e.g. more processing and packaging). These changes are facilitated by major transformations of agri-food supply chains with increased dominance of modern, large-scale food processing and wholesale and retail distribution. Its implications for rural and agricultural transformations are discussed in subsection 3.3. Higher incomes, urbanization, and the structural transformation of the economy have been supported by agricultural productivity increases, but impacts on poverty reduction have been influenced by the way in which farm

<sup>6</sup> Figure 5 is taken from Masters (2018). Using food balance sheets (FBS) to measure dietary change is notoriously imperfect as the FBS only measure food availability, not intake. Yet, they are the only source for making long-term comparative assessments over time and are indicative enough of the trends of interest for the analysis in this paper.

systems have been transformed at the same time through mechanization, changing farm size, and crop and product diversification. We turn to these processes in the next subsection.

Figure 5: From more food to different foods: the dietary transition by Asia in comparison to the rest of the world, 1961–2013



Note: Europe includes all of the former Soviet Union.

Source: Masters (2018) (with permission), based on FAO food balance sheets data.

### 3.2 Agricultural technology change and farm size

Agricultural output growth has been rather robust over the past half century, especially in East Asia (China in particular), but—from the 1970s—also in Southeast Asia and more recently also in South Asia. As Table 1 (based on Fuglie 2012, 2015) shows, in recent decades (from the 1990s), total factor productivity growth has become the main driver of agricultural output growth, whereas output growth in previous decades was mainly driven by increasing the use of inputs (land, labour, fertilizers). While growth accounting exercises have been criticized for various reasons, suggesting the magnitude of total factor productivity growth might be overstated (see e.g. Dawe 2015). Yet, the key finding of Table 1, which is that increases in efficiency have become key drivers of agricultural growth worldwide, has been corroborated by other studies (see e.g. Alexandratos and Bruinsma 2012; FAO 2017a; Vos and Bellù 2018).

Table 1: Agricultural output and TFP growth, 1961–2012

	1961–70		1971–80		1981–90		1991–2000		2001–12	
	Output	TFP	Output	TFP	Output	TFP	Output	TFP	Output	TFP
East Asia (mainly China)	4.8	0.9	3.3	0.7	4.5	1.8	5.0	3.9	3.5	3.1
Southeast Asia	2.6	0.5	3.9	1.9	3.3	0.4	3.0	1.4	4.0	2.5
South Asia	2.5	0.6	2.7	0.8	3.3	1.2	2.7	1.0	3.6	2.0

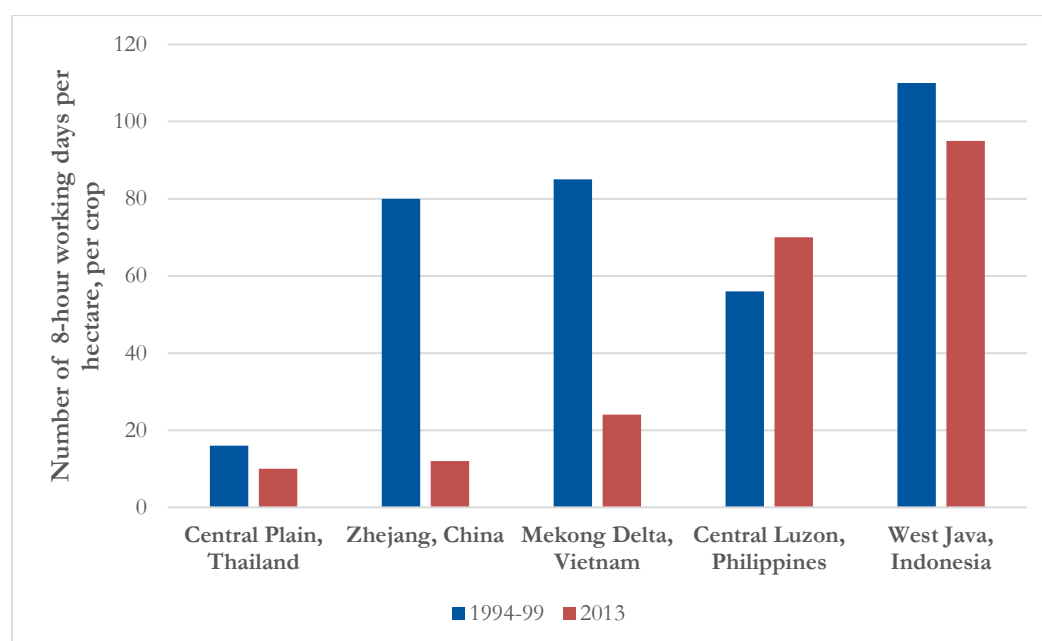
Note: Annual growth rates in per cent

Source: Based on Fuglie (2012, 2015).

Important changes in Asia's farming systems have underpinned agricultural productivity growth and efficiency gains over the past four or five decades. Reardon and Timmer (2014) summarize the evidence as showing that farms have become commercial, agricultural production has diversified (away from grains, mirroring the dietary change, as discussed later), even as individual farms have become more specialized (into cropping, or livestock, poultry, and aquaculture), and farmers have shifted from non-purchased to purchased input use (i.e. from human to animal to machine power, from manure, by-products, and residues to chemical fertilizer, and to use of more pesticides and herbicides).<sup>7</sup> The degree and speed of these changes have varied across locations. These changes occurred earliest and fastest in the 'classical Green Revolution' zones, particularly lowland rice systems and irrigated wheat areas. During the 2000s, a second wave of intensification and commercialization occurred in areas that were 'catching up' with the initial Green Revolution zones, such as in Uttar Pradesh in India, northern Bangladesh, and northeast China in rice, potato, and horticulture (Reardon, Chen et al. 2012). Gulati et al. (2004) document the diversification of agricultural production in parts of India with the development of horticulture in the 1990s and 2000s.

More recently, capital intensity of Asian agriculture has increased, significantly reflected in increased use of mechanization and less use of labour. Figure 6 (taken from Dawe 2015) shows the decline in labour use in rice cultivation in most major rice bowls in Asia. Dawe (2015) further finds uptake of machine use in agriculture (for preparing soils and harvesting) among small and larger farms alike. The development of rental markets for agricultural machinery has facilitated this process. These changes have not been across the board and, especially in many parts of South Asia, the process of commercialization-intensification/diversification-mechanization has been slower, explaining in part the slower structural transformation.

Figure 6: Change in labour use (including family labour) in rice cultivation, various rice bowls in Asia, 1994–2013



Note: Data for Indonesia refer to 1994–97.

Source: Reconstructed from Dawe (2015).

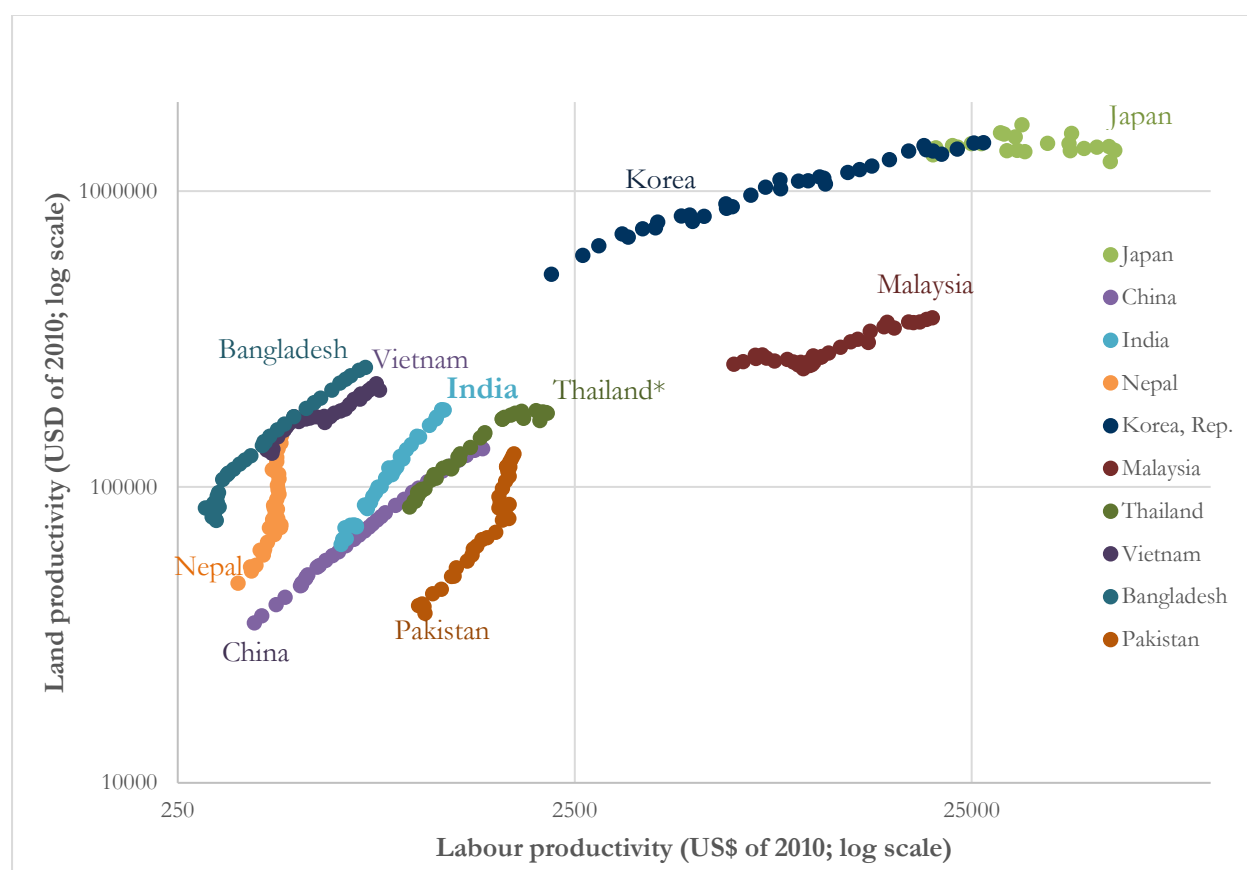
<sup>7</sup> These changes have also been documented earlier in, for instance, Cassman and Pingali (1995), Dawe (2015), and Pingali and Rosegrant (1995).

The impact on rural wages and off-farm employment of these processes of change in farm systems are relevant to the dynamics of the structural transformation process. Reardon and Timmer (2014) see an important influence running from rural non-farm employment growth and rural wage increases to greater capital intensity. Greater income from off-farm activity allows farmers to buy or rent machinery, as Takahashi and Otsuka (2009) illustrate for the case of Central Luzon in the Philippines over 1979 to 2003. Yang et al. (2013) provide evidence of rental market development and service providers of large harvesting machines in China, allowing also smaller producers to overcome economies of scale associated with machine use. Conversely, mechanization frees labour for both migration to cities and rural non-farm activities.

Improved infrastructure, like rural roads, electricity, irrigation, and communications, have been a critical factor in increasing total factor productivity in China and other parts of Asia over the past three decades (Fan 2008; Fan et al. 2004). Production areas well served by rural roads, and those closer to urban areas, have lower transaction costs of getting inputs, and higher use rates.

These changes (commercialization, modern inputs use, mechanization, improved infrastructure) have helped raise both land and total factor productivity. Growth in labour productivity has been relatively slow in South Asia, as visible from the rather steep upward-sloping land-labour productivity curves in Figure 7.

Figure 7: Land versus agricultural labour productivity in selected Asian countries, 1980–2015



Note: \* The curves for Indonesia and the Philippines, not shown here, by and large coincide with that for Thailand.

Source: Author's calculations based on FAO (n.d.) FAOSTAT for data on agricultural land, World Bank (n.d.) World Development Indicators for data on agricultural value added, and ILO (n.d.) ILOSTAT for agricultural employment.

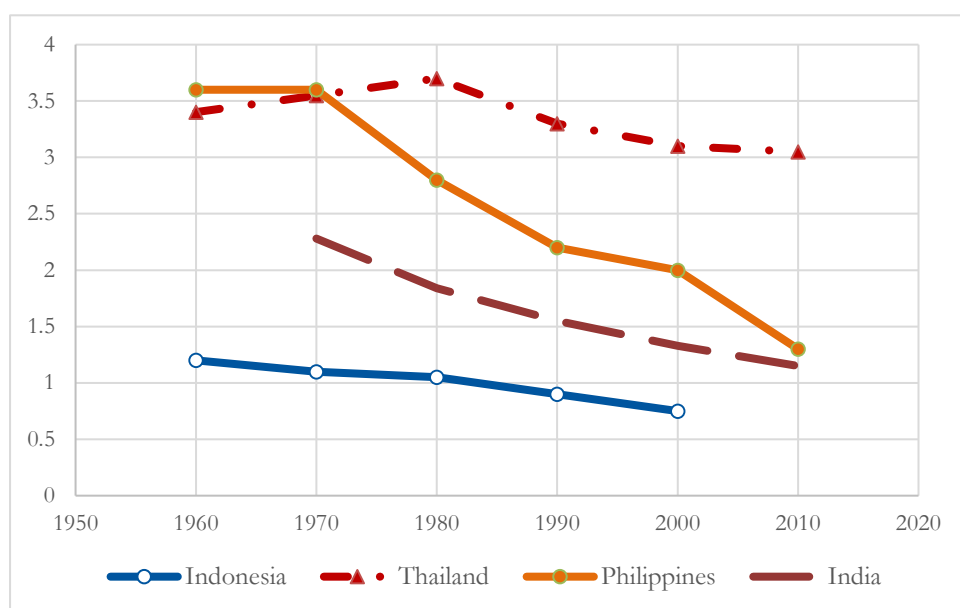
This holds for India, Pakistan, and Nepal, in particular; and to a lesser extent for Bangladesh, where labour and land productivity have moved at a similar pace, albeit both from low levels. Land and labour productivity in Indonesia, Thailand, and the Philippines initially also followed similar growth paths but giving way for faster agricultural labour productivity and wage growth from the mid-1990s as their industrialization processes further moved up the ladder. In China, land and labour productivity growth have moved in tandem since 1980, as visible in Figure 7. The institutional reforms that allowed individual farmers to sell marketable surpluses and labour to move into non-agriculture were instrumental to this development (see Section 4). In contrast, the curves are virtually flat for Japan and the Republic of Korea, which had already reached a stage of deep structural change by the beginning of the 1980–2015 period shown in Figure 7. In Malaysia, extensive plantation-based agriculture carries an important weight and its export-orientation provided a push for labour-saving productivity improvements.

These findings are consistent with those of Vos and Mikecz (2016), who find that both the level and the pace of growth in labour productivity have been much lower in low-income countries than in high-income countries over the past three decades. Slow agricultural labour productivity growth is likely also associated with insufficient expansion of employment opportunities outside agriculture in low-income countries, including those in South Asia. Despite the impacts of mechanization in parts of agriculture, on average, labour inputs per unit of land have continued to increase in South Asia, which has contributed to higher land productivity while holding back rural wage and labour productivity growth.

Slow agricultural labour productivity growth is further associated with further reductions in farm size in Asia. During Europe's earlier stages of structural change, gains in agricultural labour productivity were associated with land consolidation. In South Asia, but also in Southeast Asia, such a process of land consolidation is yet to set in. Instead, the number of landholdings continues to increase resulting in further declines in the average size of landholdings. Figure 8 shows this trend for India, Indonesia, the Philippines, and Thailand. Even in Thailand, the wealthiest of the four, the more land abundant and advanced in terms of structural transformation, the number of holdings in 2013 was still greater than in 2003. In India, the average size of landholding was cut in half over the past four decades, falling from 2.3 ha in 1970 to 1.15 ha in 2010.



Figure 8: Declining average size of farm holdings (ha) in India, Indonesia, Thailand, and the Philippines, 1960–2010



Note: Data refer to the following years for, respectively, India (1970–71, 1980–81, 1990–91, 2010–11); Indonesia (1963, 1973, 1983, 1993, 2003); Philippines (1960, 1971, 1980, 1991, 2002, 2012); and Thailand (1972, 1979, 19993, 2003, 2013).

Source: Author's calculations from Government of India, Ministry of Agriculture and Farmers Welfare (n.d.) for India, National Statistics Office (n.d.) for Thailand; Central Bureau of Statistics (BPS) of Indonesia (n.d.) for Indonesia, and Philippines Statistics Authority (n.d.) for the Philippines.

In China, in contrast, average farm size has been on the rise since 2002, though only slightly at best: it increased from 0.55 ha in that year to 0.60 ha in 2008, an increase of just 0.05 ha with nearly all of the increase coming from land consolidation in the Northeast (Nie and Fang 2013).

The broader trends towards further fragmentation of farm units is taking place in a context of continued unequal land distribution. In South Asia, 60 per cent of farmland is operated by farm units with more than 2 ha of land. In Southeast Asia, the 'larger' (with more than 2 ha) farms cultivate 77 per cent of farmlands (Eastwood et al. 2009). Most explanations of the persistence and growth of small landholdings point at several factors: continued rural population growth leading farm families to divide up land and distribute among children; the earlier-mentioned lack of non-farm employment opportunities; diversification to higher value added crops (e.g. horticulture) allowing even very small farms to be viable; and institutional restrictions on land transactions (see Deininger and Jin 2009; Eastwood et al. 2009; Gulati et al. 2004; Reardon 2013). This is not to deny that large farms are forming as well. Land rentals are contributing to these changes. In China in 1988, just 1 per cent of land was rented in, but this had grown to 18 per cent by 2008 (Jia 2013).

Yet, continued growth in the number of holdings, coupled with ever more pressing land scarcity in much of Asia, suggest that it is unlikely that farm sizes will typically become much larger for the foreseeable future. This could have two key implications. First, as labour shortages increase, mechanization will likely spread more widely, but will need to work at much smaller field scales than in other parts of the world. In addition, given credit market constraints and high fixed costs involved in owning farm machinery, most farmers would need to access machinery through rental markets.

Second, even if the trend towards fragmentation reverses soon, it will be hard to foresee massive increases in farm size to an extent it will make a substantial impact on increasing farm incomes. Thus, to avoid farm income growth from falling further behind non-farm income growth, (smallholder) farmers would need to shift to higher value added crops (non-staples) and/or diversify their incomes into non-farm sectors (or leave farming entirely).

All of these change processes are already taking place throughout Asia. The spread of rental markets for agricultural equipment was referred to earlier and further documented in Dawe (2015) and FAO (2017b). Crop diversification is also taking place as noted earlier, as visible, for instance, in rapidly increasing domestic farm supply of non-grains (fruits, vegetables, fish, meat, and dairy) (Pingali 2007). Rao et al. (2006) and Reardon and Timmer (2014) note for the case of India that there is a strong correlation between agricultural diversification, on the one hand, and the urban share and road and population density, on the other. China has also seen substantial crop diversification during the past 40 years, much of it in response to changes in dietary patterns. Land use for the cultivation of fruits, vegetable, and pulses has doubled since 1990 and now account for more area than any single cereal (although much less than all cereals taken together) (Dawe 2015).

Income diversification has also become a more common feature of Asia's rural economies. Haggblade et al. (2010) estimate that rural non-farm employment and remittance income from internal migration could make up as much as 51 per cent of total rural household income, based on survey data for Bangladesh, China, India, Korea, Nepal, Pakistan, Sri Lanka, and Viet Nam. According to these estimates, rural non-farm employment is by far the main source of income diversification.

None of these relatively recent transformative changes by themselves are guarantees for accelerated poverty reduction. Where these trends have been slow to develop, major economic and social challenges remain. Declining farm sizes reduce farmers' resource base, limit their access to finance, and prevent investment in new technologies (Jayne et al. 2010), prompting a 'premature' exit from agriculture, where smallholders abandon farming even though profitable technologies and markets exist. Even those who remain in agriculture may not be able to take advantage of rising urban demand, particularly farmers in more remote rural areas or where urban centres have better access to imported food (Hazell 2013). Falling farm sizes and import competition have further weakened agriculture's historically strong linkage to poverty reduction, given that most of the world's rural poor are smallholder farmers. Similarly, where rapid urbanization has outpaced urban economic growth and job creation, this has led to greater pressure on urban infrastructure and services and growing numbers of urban poor. Finally, the influx of young job seekers into the workforce—a 'youth bulge' (as applies to much of South Asia)—could stimulate economic growth, but it also raises concerns about an economy's capacity to create jobs (Filmer and Fox 2014)—especially the kinds of jobs that match the aspirations of younger generations (Leavy and Hossain 2014). Conversely, countries in developing East Asia have already experienced their demographic transition and now face the prospect of an ageing agricultural and rural workforce.

### **3.3 Labour markets and rural and agri-food system transformations**

Not only farm systems have changed in Asia. 'Post farm-gate' parts of food supply chains (wholesale/brokerage/logistics/cold chain, processing, and retail) have undergone major transformations, as well, with important implications for employment, income diversification, and poverty reduction among rural households. These agri-food system changes are closely related to urbanization processes, as much of Asia's food supply is already moving from rural to urban. This is creating new income and employment opportunities in wholesale, retail, processing, and logistics of providing food to growing urban populations. Such opportunities can be critical in defining pathways to climb out of poverty for those exiting agriculture or seeking to diversify incomes

during processes of agricultural transformation and structural change. The way rural–urban linkages are shaped is crucial for poverty reduction and broader economic development. Rural–urban linkages have long been recognized as a key aspect of economic development (Haggblade et al. 2007; Lewis 1954). Urban industrial and service sector growth provides employment for workers who exit agriculture, while increases in agricultural production can help avoid an increase in food prices and wages that could slow the pace of industrialization. Agricultural growth can also spur non-agricultural growth in both rural and urban areas through demand for both inputs and intermediation services, as well as consumer goods.

In areas with still widespread low productivity agriculture, such as in many parts of South Asia, low aggregate demand is likely to generate the development of low-return rural non-farm employment. The low aggregate demand may not only result from poor agriculture, but also growing agriculture with poor links to cities (see e.g. Deichmann et al. 2009, for the case of Bangladesh; Lanjouw and Shariff 2004 and Tiwari 2015, for the case of India) or to export markets so that the farmers cannot ‘realize’ sufficient profit from agricultural development. Such areas continue to see persistent poverty in a context of increasing shares of low-income non-farm employment and stagnant agricultural production.

Much of rural off-farm employment tends to be generated in the proximity of cities and towns. Recent studies suggest that dynamic structural change through agri-food system development (characterized by both rapid agricultural productivity growth and rural non-farm wage and employment growth) is more likely to occur when taking place close to smaller towns and intermediate cities (see e.g. FAO 2017b; IFPRI 2017). Based on evidence for Bangladesh, Deichman et al. (2009) similarly find that high-potential agricultural production areas that are near to cities tend to generate more and higher-return rural non-farm employment (both for wage earners and self-employed), while where the high-potential farm area is far from the city, low-return rural non-farm employment predominates, mostly only in informal services. Moreover, most of urban food demand in Asia is concentrated in smaller urban areas: about 60 per cent, according to FAO estimates (FAO 2017b), suggesting there is a large potential for dynamic rural non-farm employment creation through agri-food business development. In fact, during rapid structural transformation in Indonesia, Malaysia, and Viet Nam, food processing industries have played an important role in pulling labour into off-farm activity and account for about one-sixth of total manufacturing employment around 2010 (FAO 2017b). In Viet Nam, employment in agri-food processing more than doubled between 1999 and 2009. While still most of the employment growth (about 53 per cent) was in small, household-based enterprises in rural areas and small towns, employment growth in modern, regulated private enterprises was higher in relative terms (McGaig and Pavcnik 2016), reflective of broader changes in agri-food systems taking place in Viet Nam as much as elsewhere in Asia.

These transformations involve modernization of the midstream of food supply chains with the emergence of large-scale wholesale and retail food distributors (‘supermarket revolution’) and vertically integrated food processing companies, and reduced roles for state-operated food distribution networks (Reardon and Timmer 2014). In much of Southeast Asia (outside Viet Nam, Cambodia, Laos, and Myanmar), wholesale sector transformation started in the 1970s, while processing transformation took off in the 1980s. Retail transformation (the ‘supermarket revolution’) did not start until the mid-to-late 1990s. China, India, and Viet Nam had their growth and urbanization spurts mainly in the 1990s/2000s or opened up food industries no earlier than during the 1990s.

The massive proliferation of wholesale markets, the extension and improvement of rural roads, and the regulatory liberalization of their operations in most countries opened the door to for what Reardon and Timmer (2014) label as ‘progressive disintermediation’ in the rural areas and in supply

chains. This trend is seen to have been driven by two main factors. The first of these is regulatory changes (such as in some states in India and privatization of state-owned businesses in Viet Nam) that have freed up wholesale markets and provided incentives to large-scale traders, distributors, and food companies to establish direct links to farmers (e.g. through contract farming or supermarket-led collection centres). The second is the diffusion of wholesale markets in towns near or in rural areas, and the improvement of road systems connecting rural areas to urban wholesale markets. In many locations, however, this has undercut small-scale village traders in diverse settings and further stimulated direct purchase from farmers by wholesale market traders who previously procured via village traders.

These agri-food system changes have been accompanied by much diminished government stakes throughout Asia. Only in India does the government still retain substantial presence in wholesale trade via its grain parastatal, but even this parastatal procures no more than 20 per cent of India's grain output.

The broader agri-food supply chain transformations have been influenced by urbanization and diet change, as discussed earlier. The agri-food system changes themselves, in turn, influence both the change processes taking place downstream (in urban food markets and diets) and upstream (in factor markets and farming). As mentioned, they are bringing sources of new dynamics in the form of off-farm employment demand in processing and distribution services and a source of income diversification for farmers, bringing extra cash for investing in farm productivity and mechanization.

While potentially beneficial in the sense of dynamizing rural employment and incomes, these changes have also undermined rural livelihoods, especially where rural–urban linkages have remained weak. Large-scale urban manufacturers catering for mass markets have also displaced (and are displacing) small-scale businesses in food processing and distribution in rural areas and near or in cities, thereby diminishing non-farm rural employment without generating sufficient new jobs for the displaced workers. As mentioned, this is particularly a problem in areas with low agricultural potential and poor connectivity to urban markets.

## **4 The role of policies**

At the time when Myrdal (1968) wrote *Asian Drama*, most of developing Asia faced some similarity in initial conditions in the early stages of their economic lift off, characterized by high birth rates and relatively fertile but scarce agricultural land. The Green Revolution brought new high-yielding varieties for staple crops, facilitating substantial farm productivity increases, even for smallholders, to jumpstart agricultural transformations and structural change. While broadly adopted across the region, the speed of adoption of the new technologies and success in ‘pushing’ broader economic development through agricultural productivity growth has varied depending importantly on policies and institutional reforms.

While the nature and speed of institutional and agricultural policy reforms have differed greatly across the countries in the region, a much smaller direct role of governments in food systems has been a common feature. The parallel development has been the growth of off-farm, private sector small and medium-sized agri-food businesses and services, which have stepped into the void left by parastatals. Policy reforms further enabled entry of large-scale domestic and foreign firms such as processors and supermarket and fast food chains. Many governments took on another role in supporting transformative change, including through large infrastructure programmes that helped strengthen rural–urban linkages and food supply chain development.

Laborde et al. (2018) explain different rates of ‘success’ with agricultural transformations by key differences in agricultural price incentives, public spending priorities for investing in agricultural research and development (R&D), rural infrastructure, education and health, and reforms of rural institutions (including land reform and credit schemes) across developing-country regions and over different periods of time since 1970. According to Laborde et al. (2018), the more critical factor appears to be the degree of coherence and complementarity across these areas of intervention to promote sufficient agricultural productivity growth to facilitate (‘push’) a take-off of non-agricultural sectors by freeing up labour and savings, and by overcoming population pressures on food security.

In the remainder of this section, some of the salient features of policy and institutional change that have shaped agricultural transformations in several of the main Asian economies are discussed. These broad conclusions do not pretend to provide full proof of evidence of the precise impact of policies on agricultural and rural transformation processes. They are based on indicative notions, not dissimilar to Myrdal’s narrative of cumulative causation and state capacity to promote and facilitate economic development.

#### **4.1 Institutional reforms**

Institutional reforms in the Republic of Korea, China, and Viet Nam were critical in unleashing agricultural productive forces and labour for industry in the early stages of their growth accelerations (see also Ocampo and Vos 2008: chapter 5), though—as argued and further shown later—the impact of these reforms likely would have been much less if they were not complemented by strong public support for the development of non-agricultural (industrial) sectors.

The land reform introduced by the South Korean government with support of the United States in 1949 led to relatively equitable land distribution (Tsakok 2011). Combined with effective and sustained public support to smallholder agriculture, this proved effective to substantially lift agricultural productivity and develop commercial farming. China prioritized import-substituting industrial development until 1979, which proved detrimental to agricultural development. This radically changed with the introduction of the household responsibility system which entitled farmers and town and village enterprises to manage and commercialize production themselves and earn profits. According to one study, this institutional reform alone would explain 60 per cent of agricultural growth in China between 1978 and 1990 (EIU 2008). The reform was complemented by policies introduced in the 1980s that allowed freer labour mobility and rural-urban migration, facilitating the exit of labour resources out of agriculture and into both rural and urban non-farm employment (Tsakok 2011).

In Viet Nam, collective farming was replaced with family farming during the period of *doi moi* (the policy of renovation) in the 1980s. Under the new system, farmers were allowed to sign contracts with the government on parcels of land for up to 15 years—in effect, they leased the land—and were given the freedom to sell their products as they wished. As in the case of China, other reforms proceeded at the same time, including domestic market and trade liberalization allowing for the introduction of market-based transactions in agricultural and non-agricultural products and entry of foreign direct investment.

In the case of India, in contrast, land reform was limited to a stricter enforcement of the existing tenancy law. The government had enacted a land reform act in 1955. However, it did not enforce the law largely because of the lack of administrative and legal resources. The 1955 law and its successive amendments have guaranteed to sharecroppers permanent and inheritable incumbency rights to land that is registered, if they would pay the legally stipulated share. Because of loopholes

in the law and little administrative support for poor and often illiterate sharecroppers, very few of them had actually registered their landholding. This, combined with low levels of public investment in infrastructure and rural development, was probably a key factor in holding back agricultural productivity growth and rural transformation in most of India until at least the 1990s, after which such investments were stepped up (see United Nations 2006: 136-137 and later in the text). Where tenancy laws were better enforced, such as in the State of West Bengal, agricultural growth accelerated earlier. In West Bengal, Operation Barga proved more effective in that respect, providing security of tenure to sharecroppers during the 1970s (Banerjee et al. 2002). Helped further by rural infrastructure improvements, West Bengal experienced a significant jump in the annual growth rate of production of rice, its major food crop: from 1.8 per cent during 1960–1976 to 4.7 per cent during 1977–1994 (Raychaudhuri 2004).

Regulatory changes to other parts of the agri-food system have been important too in facilitating transformative change of agriculture and rural economies. In developing East Asia (other than China), development and opening up of wholesale distribution and food processing came with broader industrial development and urbanization during the 1960s to 1980s. China, India, and Viet Nam opened up food industries no earlier than during the 1990s. The bigger changes in most parts of the region took place from the mid-1980s to today on the wave of economic liberalization and globalization. During these phases, agri-food systems modernized and many parts of supply chains saw the emergence of large-scale operators in retail (“supermarket revolution”), wholesale, and food processing, as well as greater vertical integration of food market value chains, as mentioned in the previous section.

## **4.2 Public spending for agricultural development, education, and infrastructure development**

Key changes in indicators of public support for agriculture and rural development over the 1970–2015 period are displayed in Figure 9. The Republic of Korea maintained a high level of spending, as did China and Malaysia. In all rapidly transforming countries there was a strong focus on complementarity with public investments, including complementary support to agricultural development through public investments in research, extension services, primary education, and rural infrastructure, such as irrigation, electricity, and roads. During the 1990s and 2000s, most of China’s public spending on agriculture and rural development went to rural education (33 per cent), irrigation and water control (30 per cent), and other infrastructure, including power supply and roads (20 per cent) (Fan et al. 2004). Only 2.2 per cent was for agricultural R&D (Fan et al. 2004). The authors found a significant impact of public investment on agricultural growth and rural poverty in China either directly by stimulating agricultural production or indirectly by creating improved employment opportunities in the non-farm sector. A study of public investment in China (Fan et al. 2004) found positive returns to both agricultural production and poverty reduction for expenditures on irrigation, roads, education, and telecommunications.

In Malaysia, tree-crop agriculture (rubber, palm oil, coconut) has been a critical ingredient of natural resource-led growth and structural transformation. Government policies have underpinned productivity growth on large-scale plantations through significant R&D spending, land development, and infrastructure investment promoting the vertical integration with processing industries. In parallel, however, the Malaysian government also invested heavily in smallholder agriculture through price support schemes, input subsidies, and low-interest rate credits. Between 1971 and 1995, the share of public expenditures allocated to agriculture and rural development averaged 17 per cent. The New Agricultural Policy of 1984 provided a further push to agricultural income growth, commercialization of farming, and overall economic transformation through agricultural market development, R&D, and incentives to diversification from rice to agro-industrial crops, including rubber and palm oil (Tsakok 2011).

In the Republic of Korea, significant public rural investments were already made during the Japanese colonial period. From 1910 to 1945, investments went mostly in support of the development of the rice sector. This was part of a strategy to secure Japan's food self-sufficiency. In the immediate post-Korean war period, public investment prioritized research and extension services leading to early introduction of new high-yielding varieties, expanded use of chemical fertilizer. Land under irrigation increased by 85 per cent between 1954 and 1970, compounding the productivity-enhancing effects of the land reform (Tsakok 2011).

Indonesia stepped up funding for agricultural R&D and rural infrastructure (roads, irrigation, and electricity) during the 1970s, following the creation of the Agency for Agricultural Research and Development. These investments, together with rapid expansion of net enrolment in primary education and subsidies of Green Revolution technologies, underpinned rapid agricultural productivity growth, especially in rice production (Tsakok 2011).<sup>8</sup> Laborde et al. (2018) report on evidence showing that the rural infrastructure investments alone would account for 48 per cent of poverty reduction in Indonesia during 1976–1993, while Timmer (2005: 34) attributes roughly two-thirds of poverty reduction during the period to agricultural output growth. The Asian economic crisis of the late 1990s led the Indonesian government to heavily cut back on public investment causing a sharp slowdown in agricultural growth and a rise in rural poverty (Timmer 2005).

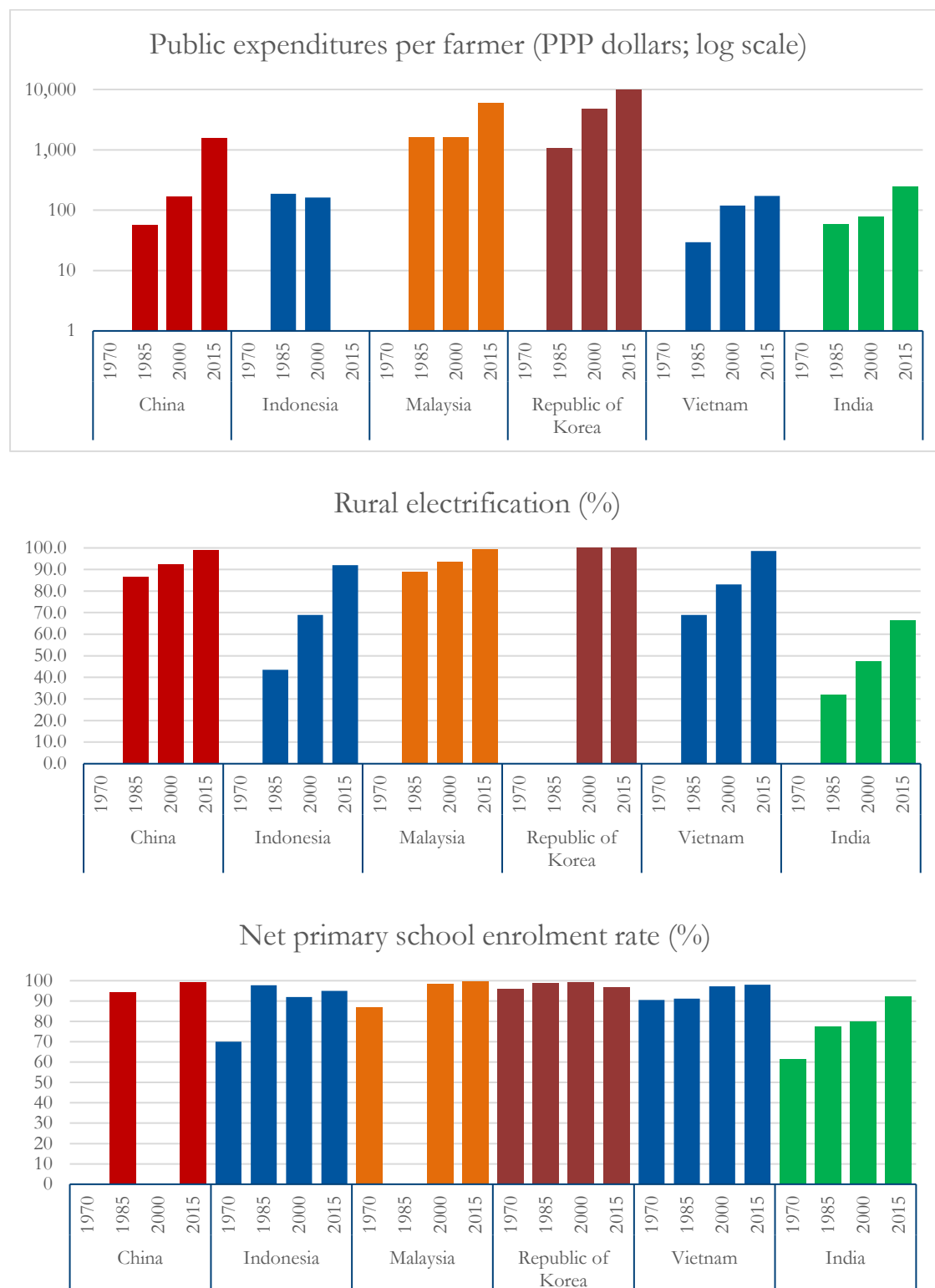
Viet Nam's institutional reforms were complemented with significant public investment in rural infrastructure (roads and electrification), as well as in basic social services, including primary education, vocational training, and healthcare. These investments paid off by the 1980s, as visible in accelerated agricultural productivity growth and fast growth of non-agricultural sectors (Van Arkadie and Duc Dinh 2004).

Public spending per farmer also increased more recently in India, but to levels no higher than those in Viet Nam and well below levels spent by faster agricultural transformers in Asia. Spending was stepped up well after the land reform of the 1970s and the lack of complementary support through improved rural infrastructure may well have contributed to the failure of that reform to contribute to agricultural productivity growth. Traditionally most public support to agriculture has been for input subsidies for fertilizers and irrigation water with much less priority for investments in rural infrastructure. More recently, such investments have been stepped up, leading to increased rural road density and access to electricity, helping to accelerate agricultural growth. Yet, at about 60 per cent, rural electrification coverage in India remains well below that in other parts of Asia where agricultural and rural transformations have progressed earlier and at a faster pace (Figure 9).

---

<sup>8</sup> Average rice yields in Indonesia doubled from 2,350 kg/ha in 1970 to 4,300 kg/ha in the 1990s (Tsakok, 2011: 48).

Figure 9: Agricultural and rural development support indicators in selected Asian countries, 1970–2015



Source: Author's calculations based on World Bank (n.d.) World Development Indicators for net enrolment rate and rural electrification and Laborde et al. (2018) for public expenditures per farmer.

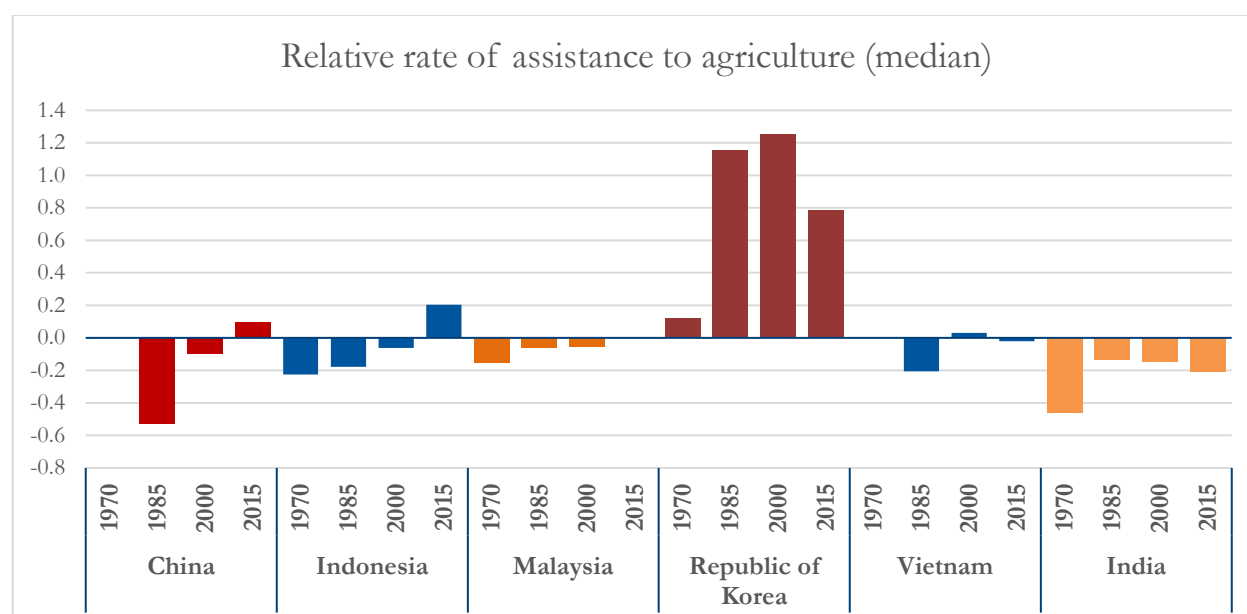


### 4.3 Price incentives

Direct price interventions played a key role in the agricultural transformation process for all countries, but the price interventions were first marked by a strong anti-agricultural bias. All countries saw a strong shift from negative to positive price supports for agriculture.

In China, price incentives were long strongly biased against agriculture. During the period of the Great Leap Forward, until 1979, agricultural incomes were squeezed through taxes and administered prices, while farmers were not allowed to market their production surpluses. The anti-agricultural bias was to foment the import substitution industrialization strategy, but keeping productivity and, hence, agricultural surpluses low (Tsakok 2011). After 1979, several constraints on agriculture were lifted with the introduction of the household responsibility system in 1979, further supported by building down the anti-agriculture bias in price incentives. Purchase prices of most agricultural products were lifted and in-quota and above-quota prices for grains, oil crops, cotton, sugar, and pork were raised (EIU 2008). In the 1990s, subsidies on various crops, including soybeans, were introduced. As a result, the net or relative rate of assistance to agriculture (RRA) has moved out of negative territory, turning positive in the 2000s (Figure 10).

Figure 10: Agriculture price incentives in selected Asian countries, 1970–2015



Note: The relative rate of assistance to agriculture (RRA) is defined as the percentage by which government policies have raised gross returns to agriculture above what they would be without the government's intervention as a ratio of government support to non-agricultural sectors. A negative RRA means support to non-agriculture is greater than that to agriculture.

Source: Adapted from Laborde et al. (2018).

The Republic of Korea also maintained an anti-agriculture bias during the initial import-substitution stage of industrial development in the 1960s. With the shift to export-led industrialization in the 1970s, however, price incentives for agriculture were stepped up turning the RRA strongly positive (Honma and Hayami 2009). The main objective of the Korean government was to keep food prices low and, hence, real urban wages down. In Indonesia, a food procurement agency with monopoly control on international trade was established in the 1960s. Floor and ceiling prices were also established for key commodities, such as rice. This held back agricultural productivity growth until these restrictions were lifted. Price ceilings were removed in the 1990s and together with targeted subsidies to promote fertilizer use and application of high-

yielding crop varieties helped turn around the anti-agricultural bias in price incentives (Tsakok 2011). Despite significant price support and input subsidies, price policies in Malaysia kept a more or less neutral stance in terms of relative protection between agriculture and non-agriculture sectors. The greater impulse to agricultural transformation came from investments in R&D, rural infrastructure, and agro-industrial development, as indicated earlier.

The RRA for Indian agriculture, in contrast, has remained negative (Figure 10), despite high input subsidies on fertilizer, in particular. Yet, public procurement of staple crop purchases for food reserve holdings and food distribution schemes tilted agricultural support in favour of consumers.

In sum, institutional reforms seem to have been critical in initial stages to unleash farm-level productive forces, while input subsidies (for seeds and fertilizers) and infrastructure development were important to promote the adoption of Green Revolution technologies from the 1970s. The returns to these public support measures have diminished over time and the push for deeper agri-food system transformations were influenced by agricultural price policy reforms and privatization of food distribution and processing networks. These more recent transformations have helped accelerate poverty reduction and underpin broader economic development, where supported by public investment in basic services and infrastructure that strengthened rural-urban linkages and enabled non-farm economic development. Agricultural and rural transformations have been slow and have failed to accelerate poverty reduction where policies and institutional reforms fell short on these counts.

## **5 The end of the ‘Asian drama’?**

Both international experience and economic theory show that structural change is an essential component of long-term economic development. Urbanization and industrial growth are key features of this structural change. Along the way, rural labour and savings are being pulled into higher productivity sectors to underpin broader economic growth. With some variation across countries, this process was key to the remarkable acceleration of economic growth in East Asia over the past half century or more, belying Gunnar Myrdal’s notion of an Asian drama. However, this ‘miracle’ could not have been come about without strong agricultural productivity growth and agrarian change in initial stages of economic take-off. The Green Revolution, reforms of agricultural and rural institutions, and public investment in rural infrastructure have been critical factors in East Asia’s take-off. In subsequent stages, industrial and other modern sector development took over as the drivers of economy-wide growth, while at the same time pushing agriculture and rural economies to deeper transformative change, as—inter alia—urbanization and income growth have induced major dietary change and pushed for more industrial organization of food systems at large.

This process is also taking place in South Asia, albeit at a slower and delayed pace. Myrdal’s concerns with India’s and other South Asian countries’ structural impediments to development, including land scarcity, historical traditions of production activity, weak institutions, and a ‘soft state’, indeed held back agricultural growth and broader economic development in cumulative causation, certainly in comparison with other parts of Asia. Yet, as these constraints were lifted, partially at least, faster growth was unleashed. However, moving forward, fewer of the lessons from East Asia’s experience may hold for India and the rest of South Asia.

Some patterns will likely remain the same. All countries will see agricultural employment become less and less important. This decline is consistent with agricultural productivity growth and wider spread of mechanization, as well as with agri-food transformations and dietary change with

increased demand for processed food and importance of off-farm activity related to food chains. But the pace of these changes has been different and will be different across countries (as much as across regions within countries).<sup>9</sup>

Structural transformation is already most advanced in the countries of developing Asia, but pathways have differed starkly. In Malaysia, agricultural export growth and extensive farming have driven rapid labour exit from agriculture, leading to faster declining agricultural employment share than the sector's GDP share. Elsewhere, as in India, much of South Asia, and to a lesser extent in Indonesia, Thailand, Viet Nam, and the Philippines, the decline of agriculture's employment share has lagged the drop of agriculture's share in GDP. These contexts are further characterized by increased fragmentation of landholdings. Agricultural labour productivity growth has been slower in consequence and could slow down poverty reduction if not offset by other drivers. Employment growth in non-farm (agri-food and other manufacturing) activities as well as agricultural exports have been important other drivers for poverty reduction in the Southeast Asian countries. Such factors have been less dynamic in recent decades in the countries of South Asia, warranting the expectation that poverty among their populations will be far from eradicated in the coming decades.

The ability of small farms to be efficient and dynamic agri-food systems to develop so as to underpin dynamic and inclusive structural change have been strongly conditioned by public investments and policy choices, as discussed in Section 4.

Ongoing urbanization and modernization of agri-food systems are changing the nature of rural transformations. Farm efficiency and rural employment opportunities are increasingly influenced by what happens beyond the farm gate and the strength of rural–urban linkages. But this unlikely will suffice to put an end to the Asian drama. Land scarcity combined with continued population pressure has led to further fragmentation of landholdings and to added pressure on already degraded land and water resources (Vos and Bellù 2018). Such constraints imply continuation along past development pathways will hit on environmental constraints. Likewise, while structural change has dramatically brought down poverty and undernourishment in Asia, dietary and food system changes have brought new malnutrition challenges as overweight and obesity are on the rise.<sup>10</sup>

Finding the appropriate balance between an effective public role and an efficient private role in the modernization of agriculture and the entire food system has always been a difficult challenge. The balance not only needs to focus on underpinning economic growth and development with more productive agriculture and food systems, but also on doing so in a sustainable way and avoiding new burdens of malnutrition and disease to take away from economic progress. The political economy of pathways will be tricky. Myrdal's notion of cumulative causation remains valid

---

<sup>9</sup> Given the scope of this paper, there was no room to also discuss sub-national and spatial differences and inequalities in the key patterns of structural change and rural transformations as discussed for the national level. Such sub-national differences can be quite significant, however, as described, for instance, in Ahsan and Mitra (2016) for state-level patterns of structural change in India and McCaig and Pavcnik (2016) for differences across major regions in Viet Nam.

<sup>10</sup> While still significantly lower than in high-income countries like the United States, the prevalence of obesity has increased steeply in most Asian countries. It has doubled or tripled in Thailand and Malaysia between 2000 and 2016 to affect well over 10 per cent of the adult population. Obesity has also (near) tripled in China and Indonesia in the same period. (Data based on age-standardized body mass index estimates of the World Health Organization (WHO 2017).

for understanding of today's trade-offs, despite the remarkable economic progress made since he wrote *Asian Drama*.

## References

- Alexandratos, N., and J. Bruinsma (2012). 'World Agriculture towards 2030/2050: The 2012 Revision'. ESA Working Paper 12–03. Rome: Food and Agriculture Organization of the United Nations.
- Ashan, R.N., and D. Mitra (2016). 'Can the Whole Be Greater than the Sum of its Parts? Lessons from India's Growing Economy and Evolving Structure'. In M. McMillan, D. Rodrik, and C. Sepúlveda (eds), *Structural Change, Fundamentals, and Growth*. Washington, D.C.: International Food Policy Research Institute.
- Banerjee, A., P.J. Gertler, and M. Ghatak (2002). 'Empowerment and Efficiency: Tenancy Reform in West Bengal'. *Journal of Political Economy*, 110(2) (April): 239–80.
- Cassman, K., and P. Pingali (1995). 'Intensification of Irrigated Rice Systems: Learning from the Past to Meet Future Challenges.' *GeoJournal*, 35(3): 299–305.
- Central Bureau of Statistics (BPS) of Indonesia (n.d.). 'Sensus Pertanian'. Various years (1963, 1973, 1983, 1993, and 2003). Available at: <https://microdata.bps.go.id/mikrodata/index.php/catalog/81> (accessed on 3 February 2018).
- Dawe, D. (2015). 'Agricultural Transformation of Middle-income Asian Economies: Diversification, Farm Size and Mechanization'. ESA Working Paper 15-04. Rome: Food and Agriculture Organization of the United Nations.
- Deichman, U., F. Shilpi, and R. Vakis (2009). 'Urban Proximity, Agricultural Potential and Rural Non-farm Employment: Evidence from Bangladesh'. *World Development*, 37(3): 645–60.
- Deininger, K., and S. Jin (2009). 'Securing Property Rights in Transition: Lessons from Implementation of China's Rural Land Contracting Law'. *Journal of Economic Behavior & Organization*, 70(2): 22–8.
- Eastwood, R., M. Lipton, and A. Newell (2009). 'Farm Size'. In P. Pingali and R. Evenson (eds), *Handbook of Agricultural Economics*. Volume 4. Amsterdam: Elsevier.
- EIU (Economic Intelligence Unit) (2008). 'Lifting African and Asian Farmers out of Poverty.' Research Project for the Gates Foundation. New York, NY (mimeo).
- Fan, S. (2008). *Public Expenditures, Growth, and Poverty: Lessons from Developing Countries*. Baltimore, MD: Johns Hopkins University Press.
- Fan, S., L. Zhan, and X. Zhang (2004). 'Reforms, Investment and Poverty in Rural China'. *Economic Development and Cultural Change*, 52(2): 395–421.
- FAO (n.d.). 'FAOSTAT'. Available at: <http://www.fao.org/faostat/en/#data/RL> (accessed on 31 January 2018).
- FAO (2017a). *The Future of Food and Agriculture: Trends and Challenges*. Rome: Food and Agriculture Organization of the United Nations.
- FAO (2017b). *The State of Food and Agriculture 2017: Leveraging Food Systems for Inclusive Rural Transformation*. Rome: Food and Agriculture Organization of the United Nations.
- FAO (n.d.). 'FAOSTAT'. Available at: <http://www.fao.org/faostat/en/#data/RL> (accessed on 31 January 2018).

- Filmer D., and L. Fox (2014). *Youth Employment in Africa*. Washington D.C.: World Bank.
- Fuglie, K.O. (2012). 'Productivity Growth and Technology Capital in the Global Agricultural Economy'. In K.O. Fuglie, S.L. Wang, and V.E. Ball (eds), *Productivity Growth in Agriculture: An International Perspective*. Oxfordshire, UK: CAB International.
- Fuglie, K.O. (2015). 'Accounting for Growth in Global Agriculture'. *Bio-based and Applied Economics*, 4(3): 221–54.
- Government of India, Ministry of Agriculture and Farmers Welfare (n.d.). 'India, Agricultural Census'. Various years (1970-1, 1980-1, 1990-1, 2000-1, 2010-11), online documents and database. Available at: <https://agcensus.nic.in/document.html> (accessed on 3 February 2018).
- Groningen Growth and Development Centre (n.d.). 'Groningen Growth and Development Centre Database'. Available at: <https://www.rug.nl/ggdc/historicaldevelopment/> (accessed on 15 December 2017).
- Gulati, A., L. Tewari, P.K. Goshi, and P.S. BIRTHAL (2004). 'Agriculture Diversification in South Asia: Patterns, Determinants and Policy Implications'. *Economic and Political Weekly*, 39(24): 2457–67.
- Haggblade, S., P.B.R. Hazell, and P.A. Dorosh (2007). 'Sectoral Growth Linkages between Agriculture and the Rural Nonfarm Economy'. In S. Haggblade, P.B.R. Hazell, and T. Reardon (eds), *Transforming the Rural Nonfarm Economy: Opportunities and Threats in the Developing World*. Baltimore, MD: Johns Hopkins University Press.
- Haggblade, S., P. Hazell, and T. Reardon (2010). 'The Rural Non-farm Economy: Prospects for Growth and Poverty Reduction'. *World Development*, 38(10): 1429–41.
- Hazell, P. (2013). 'Urbanization and Farm Size Changes in Africa and Asia: Cross Regional Comparison and Implications for Agricultural Research'. Background Paper for the ISPC Foresight Study on Farm Size and Urbanization. Rome. Available at: <http://www.sciencecouncil.cgiar.org/sections/strategy-trends> (accessed on 15 December 2017).
- Hirschman, A.O. (1958). *The Strategy of Economic Development*. New Haven, CT: Yale University Press.
- Honma, M., and Y. Hayami (2009). 'Japan, Republic of Korea, and Taiwan, China.' In K. Anderson (ed.), *Distortions to Agricultural Incentives: A Global Perspective, 1955-2007*. London: Palgrave/Macmillan.
- IFPRI (2017). *Global Food Policy Report*. Washington D.C.: International Food Policy Research Institute.
- ILO (International Labour Organization) (n.d.). 'ILOSTAT: Key Indicators of the Labour Market (KILM)'. Available at: [https://www.ilo.org/ilostat/faces/wcnav\\_defaultSelection;ILOSTATCOOKIE=gM8ayXNh9D9HNEfSRtphuTIUkb-RKuL-ZKvMGBIwERmDrmkySl4l351759245?\\_afLoop=806999627626846&\\_afWindowMode=0&\\_afWindowId=null#!%40%40%3F\\_afWindowId%3Dnull%26\\_afLoop%3D806999627626846%26\\_afWindowMode%3D0%26\\_adf.ctrl-state%3D13a22tcoa6\\_4](https://www.ilo.org/ilostat/faces/wcnav_defaultSelection;ILOSTATCOOKIE=gM8ayXNh9D9HNEfSRtphuTIUkb-RKuL-ZKvMGBIwERmDrmkySl4l351759245?_afLoop=806999627626846&_afWindowMode=0&_afWindowId=null#!%40%40%3F_afWindowId%3Dnull%26_afLoop%3D806999627626846%26_afWindowMode%3D0%26_adf.ctrl-state%3D13a22tcoa6_4) (accessed on 31 January 2018).
- Ivanic, M., and W. Martin (2018). 'Sectoral Productivity Growth and Poverty Reduction: National and Global Impacts'. *World Development*, 109(issue C): 429–39.

- Jayne, T.S., N. Mason, R. Myers, J. Ferris, D. Mather, N. Sitko, M. Beaver, N. Lenski, A. Chapoto, and D. Boughton (2010). 'Patterns and Trends in Food Staples Markets in Eastern and Southern Africa: Toward the Identification of Priority Investments and Strategies for Developing Markets and Promoting Smallholder Productivity Growth'. International Development Working Paper 104. Ann Arbor, MN: Michigan State University. Available at: <http://www.aec.msu.edu/fs2/zambia/idwp104.pdf> (accessed on 3 February 2018).
- Jia, X. (2013). 'Transforming Agricultural Production in China: From Smallholders to Pluralistic Large Farms'. Paper presented at FAO, 16 December 2013, Rome.
- Laborde, D., T. Lallemant, K. McDougall, C. Smaller, and F. Traoré (2018, forthcoming). *Transforming Agriculture in Africa and Asia. The Role of Policies and Public Investment*. Washington D.C. and Geneva: IFPRI and IISD.
- Lanjouw, P., and A. Shariff (2004). 'Rural Non-farm Employment in India: Access, Incomes and Poverty Impact'. *Economic and Political Weekly*, 39: 4429–46.
- Lankester, T. (2004). "'Asian Drama'": The Pursuit of Modernization in India and Indonesia'. *Asian Affairs*, XXXV (III), November.
- Lewis, W.A. (1954). 'Economic Development with Unlimited Supplies of Labor'. *The Manchester School*, 22(2), 139–91.
- Leavy, J., and N. Hossain (2014). 'Who Wants to Farm? Youth Aspirations, Opportunities and Rising Food Prices'. IDS Working Paper Vol. 2014, No. 439. Brighton: Institute of Development Studies.
- Masters, W.A. (2018). 'Rural Transformation and Nutrition Transition: Same Pathways, Different Speeds?'. Presentation at PIM Workshop on Rural Transformation in the 21st Century, International Conference of Agricultural Economists, Vancouver, 28 July.
- Masters, W.A., A.A. Djurfeldt, C. De Haan, P. Hazell, T. Jayne, M. Jirström, and T. Reardon (2013). 'Urbanization and Farm Size in Asia and Africa: Implications for Food Security and Agricultural Research'. *Global Food Security*, 2(3): 156–65.
- McCaig, B., and N. Pavcnik (2016). 'Moving out of Agriculture: Structural change in Viet Nam'. In M. McMillan, D. Rodrik, and C. Sepúlveda (eds), *Structural Change, Fundamentals, and Growth*. Washington D.C.: International Food Policy Research Institute.
- Myrdal, G. (1957). *Economic Theory and Underdeveloped Regions*. London: University Paperbacks, Methuen
- Myrdal, G. (1968). *Asian Drama: An Inquiry into the Poverty of Nations (Vol, I, II and III)*. A Twentieth Century Fund Study. New York: Pantheon.
- National Statistics Office (n.d.). 'Thailand, Agricultural Census'. Various years (1963, 1972, 1979, 1993, 2003, 2013) online database. Available at: [http://web.nso.go.th/en/census/agricult/cen\\_agri03.htm](http://web.nso.go.th/en/census/agricult/cen_agri03.htm) (accessed on 3 February 2018).
- Nie, F., and C. Fang (2013). 'Family Farming in China: Structural Changes, Government Policies and Market Development for Growth Inclusive of Smallholders'. Seminar Presentation at FAO on 13 December. Rome: Food and Agriculture Organization of the United Nations.
- Ocampo, J.A., and R. Vos (2008). *Uneven Economic Development*. London: Zed Books (for United Nations).
- Philippines Statistical Authority (n.d.). 'Census of Agriculture and Fisheries'. Various years (1960, 1971, 1980, 1991, 2002, 2012). Available at: <http://psa.gov.ph/content/census-agriculture-and-fisheries-caf> (accessed on 3 February 2018).



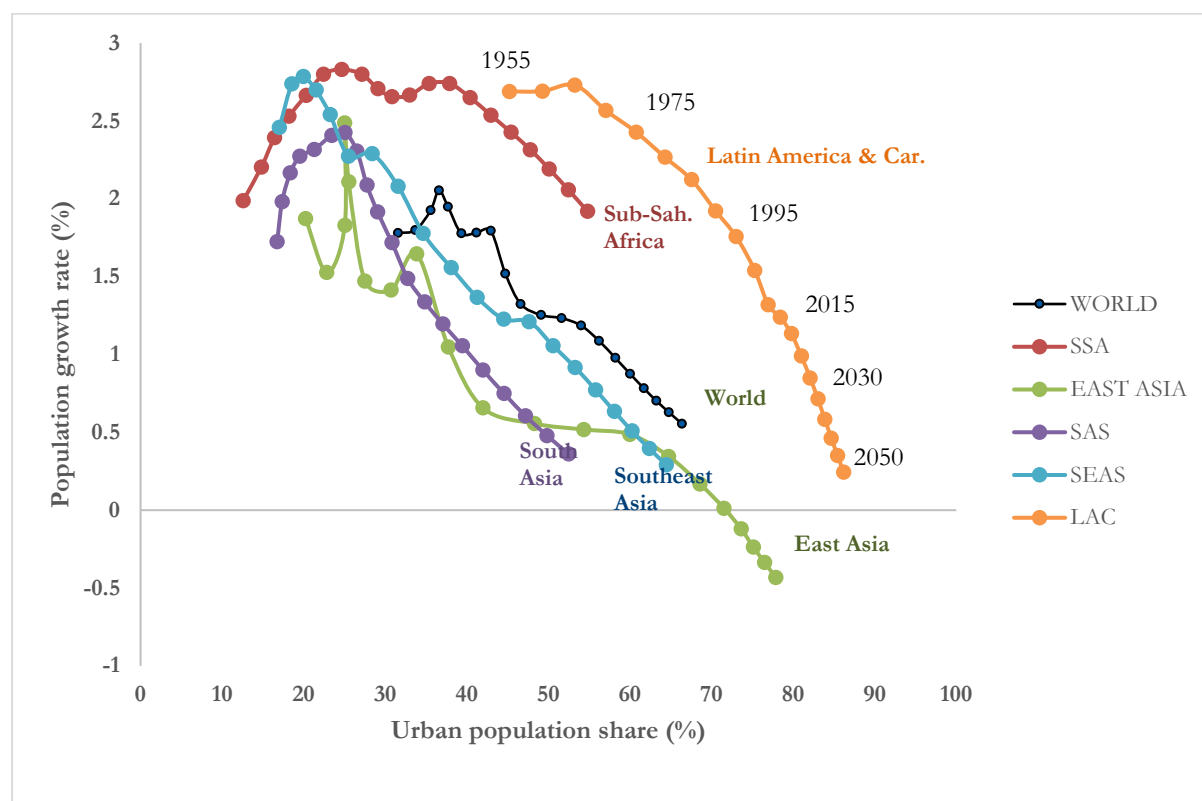
- Pingali, P. (2007). 'Westernization of Asian Diets and the Transformation of Food Systems: Implications for Research and Policy'. *Food Policy*, 32(3): 281–98.
- Pingali, P., and M. Rosegrant (1995). 'Agricultural Commercialization and Diversification: Processes and Policies'. *Food Policy*, 20: 171–85.
- Rao, P.P., P.S. BIRTHAL, and P.L. JOSHI (2006). 'Diversification towards High Value Agriculture: Role of Urbanization and Infrastructure'. *Economic and Political Weekly*, 41(26): 2747–53.
- Raychaudhuri, A. (2004). 'Lessons from the Land Reform Movement in West Bengal, India'. Paper Presented at Scaling Up Poverty Reduction: A Global Learning Process and Conference, Shanghai, China, 25–27 May.
- Reardon, T. (2013). 'Asia Agrifood System's 5 Linked Transformations: Implications for Agricultural Research and Development Strategies.' A Foresight Study of the Independent Science and Partnership Council (ISPC/CGIAR). Rome (mimeo).
- Reardon, T., and C.P. Timmer (2014). 'Five Inter-linked Transformations in the Asian Agrifood Economy: Food Security Implications'. *Global Food Security*, 3: 108–17.
- Reardon, T., K. Chen, B. Minten, and L. Adriano (2012). *The Quiet Revolution in Staple Food Value Chains in Asia: Enter the Dragon, the Elephant, and the Tiger*. Washington D.C.: International Food Policy Research Institute and Asian Development Bank.
- Reardon, T., C.P. Timmer, and B. Minten (2012). 'The Supermarket Revolution in Asia and Emerging Development Strategies to Include Small Farmers'. *Proceedings of the National Academy of Sciences*, 109(31): 12332–37.
- Siegel, B. (2017). 'Asian Drama Revisited'. *Humanity*, 8(1): 195–205.
- Takahashi, K., and K. Otsuka (2009). 'The Increasing Importance of Nonfarm Income and the Changing Use of Labor and Capital in Rice Farming: The Case of Central Luzon, 1979–2003'. *Agricultural Economics*, 40(2): 231–42.
- Thurlow, J., P. Dorosh, and B. Davis (2018, forthcoming). 'Demographic Change, Agriculture and Rural Poverty'. In Cl. Campanhola and S. Pandey (eds), *Sustainable Food and Agriculture: An Integrated Approach*. Elsevier Publishers.
- Timmer, C. Peter (2005). 'Indonesia. Operationalizing Pro-Poor Growth.' Country Study for the World Bank. Washington D.C.: The World Bank. Available at: <http://siteresources.worldbank.org/INTPGI/Resources/342674-1115051237044/oppgindonesiaMay2005.pdf> (accessed on 3 March 2018).
- Timmer, C.P. (2008). 'A World without Agriculture: The Structural Transformation in Historical Perspective'. Henry Wendt Memorial Lecture. Washington D.C.: American Enterprise Institute.
- Timmer, C.P. (2014). 'Managing Structural Transformation: A Political Economy Approach'. UNU-WIDER Annual Lecture 18. Helsinki: United Nations University World Institute for Development Economics Research.
- Tiwari, S. (2015). 'Managing Transformation of Rural India through Rural Non-farm Economy'. *Journal of Rural and Industrial Development*, 3(2): 37–47.
- Tsakok, I. (2011). *Success in Agricultural Transformation. What it Means and What Makes it Happen*. Cambridge: Cambridge University Press.
- Tschirley, D., T. Reardon, M. Dolislager, and J. Snyder (2015). 'The Rise of a Middle Class in East and Southern Africa: Implications for Food System Transformation'. *Journal of International Development*, 27(5): 628–46.

- United Nations (2006). *World Economic and Social Survey 2006: Diverging Growth and Development*. New York, NY: United Nations Department of Economic and Social Affairs.
- United Nations (2017). 'World Population Prospects: The 2017 Revision'. Online Database. Available at: <https://esa.un.org/unpd/wpp/Download/Standard/Population/> (accessed on 3 March 2018).
- Van Arkadie, B., and D. Duc Dinh (2004). 'Economic Reform in Tanzania and Vietnam: A Comparative Commentary.' William Davidson Institute Working Paper Series 706. Ann Harbor, MN: University of Michigan.
- Vos, R., and L. Bellù (2018, forthcoming). 'Global Trends and Challenges to Food and Agriculture into the Twenty-first Century'. In C. Campanhola and S. Pandey (eds), *Sustainable Food and Agriculture: An Integrated Approach*. Elsevier Publishers.
- Vos, R., and O. Mikecz (2016). 'Can Smallholders Double their Productivity and Incomes by 2030?'. ESA Working Paper 16-04. Rome: Food and Agriculture Organization of the United Nations.
- Yang, Y., Z. Huang, X. Zhang, and T. Reardon (2013). 'The Rapid Rise of Cross-regional Agricultural Mechanization Services in China'. *American Journal of Agricultural Economics*, 95(5): 1245–51.
- WHO (World Health Organization) (2017). 'Global Health Observatory Data Repository: Prevalence of Obesity among Adults, BMI  $\geq$  30, Age-standardized Estimates by Country'. Available at: <http://apps.who.int/gho/data/node.main.A900A?lang=en> (accessed on 3 March 2018).
- World Bank (2008). *World Development Report: Agriculture for Development*. Washington D.C.: The World Bank.
- World Bank (2017). 'PovcalNet: An Online Analysis Tool for Global Poverty Monitoring.' Washington D.C.: World Bank. Available at: <http://iresearch.worldbank.org/PovcalNet> (accessed August 2018).
- World Bank (n.d.). 'DataBank: World Development Indicators'. Available at: <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators> (accessed on 15 December 2017)



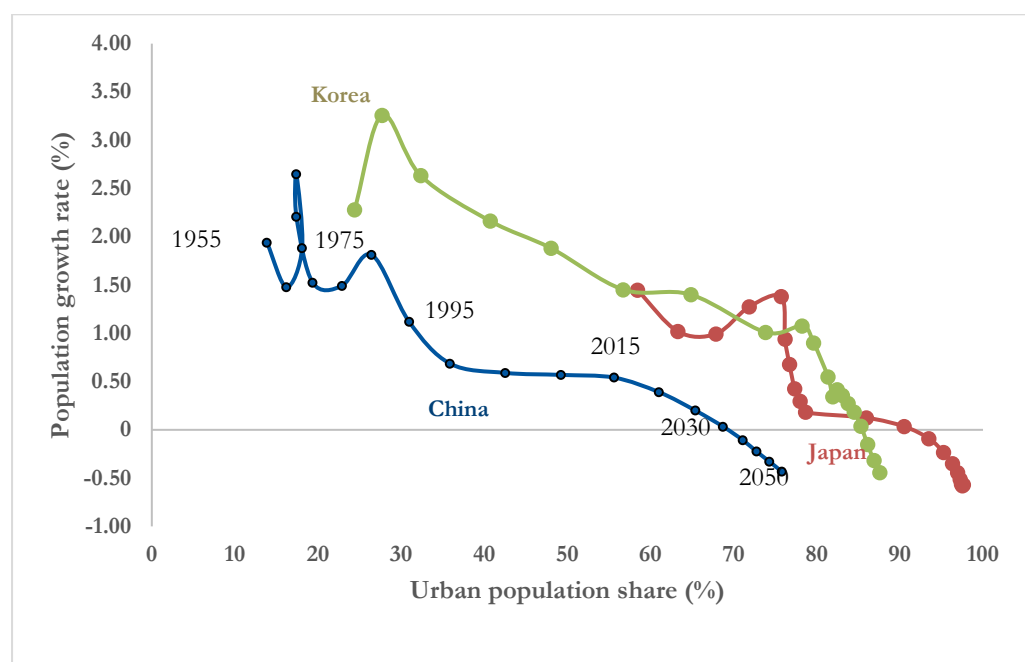
## Appendix

Figure A.1: Population growth and urbanization in developing countries, by major geographic region, 1955–2050



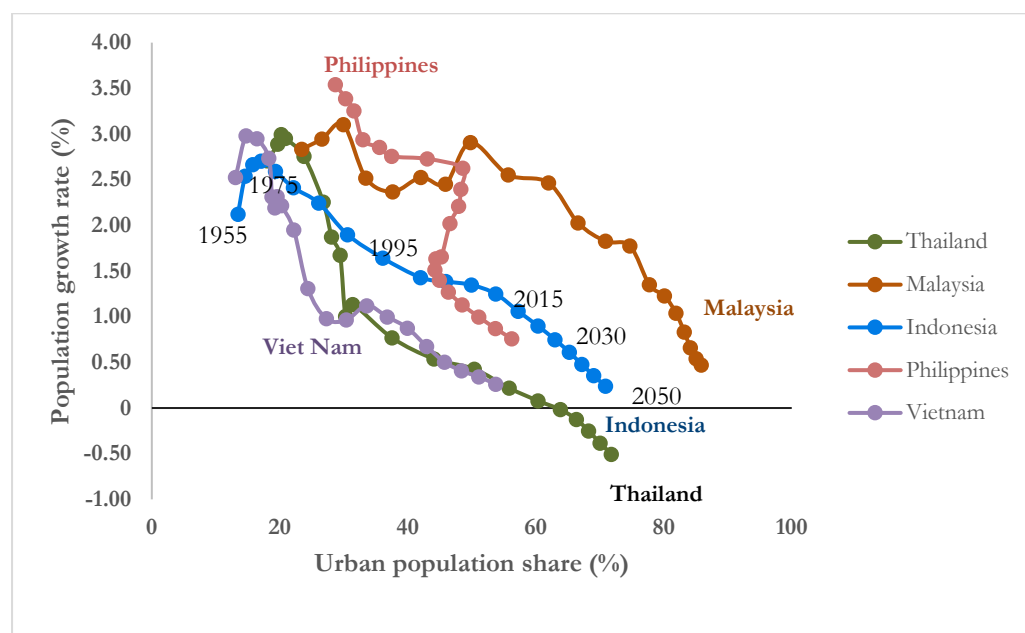
Source: Author's calculations based on UN Population Division, World Population Prospects: The 2017 Revision, online database (United Nations 2017).

Figure A.2a: Population growth and urbanization in East Asia (China, Korea, and Japan), 1955–2050



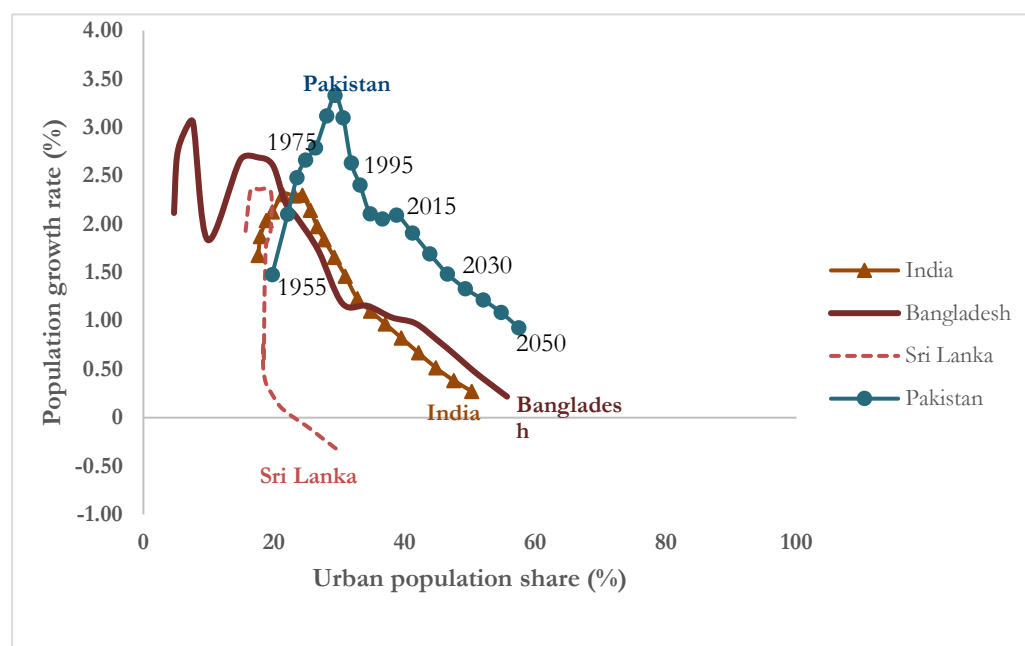
Source: See Figure A.1

Figure A.2b: Population growth and urbanization in Southeast Asia (Indonesia, Thailand, Malaysia, Philippines and Viet Nam), 1955–2050



Source: See Figure A.1

Figure A.2c: Population growth and urbanization in South Asia (Bangladesh, India, Sri Lanka, and Pakistan), 1955–2050



Source: See Figure A.1.